JPRS-EST-88-009
7 OCTOBER 1988

FOREIGN BROADCAST INFORMATION SERVICE

JPRS Report

Science & Technology

Europe

Science & Technology
Europe

JPRS-EST-88-009

CONTENTS

7 OCTOBER 1988

DEFENSE INDUSTRIES

FACTORY AUTOMATION, ROBOTICS

LASERS, SENSORS, OPTICS

MICROELECTRONICS

NUCLEAR ENGINEERING

SCIENCE & TECHNOLOGY POLICY

SUPERCONDUCTIVITY

TECHNOLOGY TRANSFER

EAST EUROPE

COMPUTERS

FACTORY AUTOMATION, ROBOTICS

MICROELECTRONICS

ADVANCED MATERIALS

Canadian Microgravity Research Examined

3698A220 Paris CPE BULLETIN in French
Feb-Mar 88 pp 55-58

[Article by Roger Bluzat: "Microgravity Research and Its Prospects in Canada," based on a report drafted by the Scientific Section of the French Embassy in Ottawa]

[Text] Microgravity is the near-zero gravity that is characteristic of orbital flight: At the altitude of an orbital station (approximately 500 km), gravitation is only one millionth as strong as on earth. This allows experiments to be carried out and materials to be produced that could not be considered on earth.

U.S. studies have shown that, in the year 2000, 35 percent of the space market will involve the commercial use of microgravity. It is therefore a very promising market, even though still hypothetical.

Following the Challenger accident, microgravity programs as a whole were delayed by 2 to 3 years. This report attempts to present projects currently under way in Canada.

1. Public Research

Materials Processing and Space Equipment

The project of Reginald W. Smith and H. Shahani, professors at Queen University in Kingston (Ontario), pertains to alloys, crystals, and the degradation and repair of materials in space.

In a mixture, particle movement leading to homogenization is an important factor with numerous industrial applications, particularly during crystallization. Convection phenomena make it difficult to measure diffusion on earth. This experiment will measure the diffusion velocities and coefficients of several metals melted in microgravity and at various temperatures.

The project team also plans to study techniques for bonding and welding materials in space (and on the space station).

The study of materials behavior in space has so far led to two experiments aimed at evaluating the degradation of composite materials in space: ACOMEX (Advanced Composite Materials Experiment) and LDEF (Long-Duration Exposure Facility).

In the ACOMEX experiment, various samples were attached to the remote manipulator arm and exposed to a highly agressive environment for 38 hours. It was found upon analysis that the materials had suffered serious damage and that their properties had been altered, a disturbing result as regards prospects for their use in fixed space structures.

The LDEF experiment consisted in loading samples onto a satellite orbited by the space shuttle in 1984 and to be recovered by NASA after 3 or 4 years of exposure. At the same time, a data collection system was installed on board. Using the ACOMEX results, Rod Tennyson developed a simulator that allowed the most promising materials to be selected.

Biotechnology

David Armstrong of the CNRC [Canadian National Research Council] heads a laboratory for the study of crystal growth, protein cultures, and fermentation in space.

Especially significant work is being done by D. E. Brooks, from the University of British Columbia, to determine the effectiveness in space of the so-called "phase partition" process, which allows the separation of tumorous cells from healthy ones in bone marrow intended for transplants. The process involves the use of two nonmiscible solutions in which particles can be preferentially fixed. The influence of electrical fields on solutions will also be evaluated.

The University of Toronto's Department of Physiology (D. A. Sun) and Connaught Laboratories are interested in microencapsulation, a technology that consists in inserting islets of insulin-secreting cells into small, semiporous capsules, thus avoiding rejection by the immune system of diabetics.

Life Sciences

This is the oldest field of study; Montreal, Toronto, and Vancouver are the three Canadian focal points.

Professors Douglas Watt (McGill University, Montreal) and Ken Money (Defense and Civil Institute for Environmental Medicine, Toronto) have collaborated for over 20 years in the field of neurosensory physiology. They developed the SASSE (Space Adaptation Syndrome Supplementary Experiments) program implemented by Marc Garneau (flight 41G). Half a dozen experiments have been carried out relating to airsickness, the vestibular system (to understand its operation under 0 g as well as 2 g), disorientation (loss of awareness of the position of limbs or external objects), and proprioceptive illusions (the impression of seeing the ground move under one's feet or the walls closing in...).

At Shaughnessy Hospital in Vancouver, a team is working on research into "Back Pain in Astronauts" (BPA). Its objective will be to keep a daily record during future shuttle missions of symptoms and then to obtain three-dimensional images of spinal column deformities using two cameras. In Toronto, Dr D. Grynpas is interested in changes in calcified tissues that cause weakening of the skeleton. Howard Parsons' team at the University of Calgary is preparing to evaluate human energy expenditure under 0 g.

In Ottawa and Montreal, astronaut Bob Thirsk is working on the design of an antigravity suit, to be worn during the shuttle's return to earth, that will prevent blood from flowing to the lower parts of the body.

2. Private Companies

To date, these have shown no intention of investing in microgravity, as certain U.S. companies (McDonnell Douglas and 3M) have already done—to the tune of several million dollars. Consequently, the CNRC was forced to launch the "User Development Program" (a call for proposals with a view to subsidizing the most noteworthy projects), aimed at encouraging the private sector to invest in potential industrial applications. More than $4 million has been amassed for materials processing due to its technical relevance and commercial prospects.

Materials Processing and Spaceborne Equipment

—BM Hitech ($443,000)

This is Phase II in the production of glass for infrared sensors and optical instruments, and perhaps for the next generation of optical fibers.

In phase I, a series of fluorinated glasses was developed and their properties evaluated.

The possibility of manufacturing without a container is the essential advantage of microgravity. The company is developing a levitation device in an attempt to reproduce this characteristic on earth and to select the most suitable materials for a subsequent study in microgravity.

—CAL (Canadian Astronautics Limited, $978,000; subcontractors: COMINCO and APTEC.

In the first phase, this project consisted in evaluating a floating-zone method for high-purity germanium production under microgravity conditions. It is currently focusing on the manufacture and testing of a double-toroidal-ellipsoidal oven that would permit the control of Marangoni-effect convection currents in the production of semiconductors.

—MPB Technologies Inc ($96,000; subcontractors: McGill University, OMVPE Technologies, Opto-Electronics)

During the first phase (1986), MPB developed a heating device for depositing GaAs thin films on a substrate using liquid-phase electroepitaxy (LPEE) as growth method. The method consists in subjecting the solution to an electrical field, producing a migration of charged particles toward the substrate, a saturated area, thus permitting crystal deposition.

—AASS Aerospace Ltd ($88,000, subcontractor: ALMAX)

This project, launched in December 1986, concentrates on the production in space of oxide and/or nonoxide ceramic powders having potential applications in the 100-gigahertz frequency range.

—COMINCO Ltd ($60,000)

COMINCO's Electronic Materials Division is a leader in the production of cadmium-mercury tellurides (CMT), gallium arsenide, and semiconductors. In March 1987, the company carried out an experiment (dubbed GEODE) on board the Swedish Maser-1 rocket: It was intended to evaluate the effects of microgravity on CMT crystallization, whose heterogeneity appears during solidification on earth. The results after analyzing the CMT sample obtained will make it possible to modify oven design for longer flights.

—SED Systems Ltd ($97,000; subcontractor: COMINCO)

SED is to supply the electronic control equipment for a large-diameter oven that will be designed on the basis of the GEODE experiment. COMINCO will supply electronic control equipment. COMINCO will be the end user of this oven for the production of CMT and other semiconductors.

—Ontario Research Foundation (one contract for $100,000, subcontractor: COMDEV; and another for $95,000)

The first contract covers research into the production of new high-performance magnetic ceramics through rapid solidification in microgravity.

The second contract concerns the use of a new technology to produce larger and more uniform ceramic microspheres than those produced under 1 g. These balls reportedly have industrial applications in high-temperature gas turbines and diesel engines.

—Electrofuels Manufacturing Co ($440,000; subcontractors: SPAR Aerospace, SED Systems, University of Toronto)

Launched in November 1986, this project addresses the theory and mechanisms of disperse phase systems in order to develop a high-energy-density battery for use in space. Since this battery will operate at a temperature close to 400 degrees Celsius, an oven will be designed to study phase separations in mixtures of transparent and liquid LiCl-KCl, at 600 degrees Celsius, with opaque sulfide particles.

Biotechnology

—Canadian Astronautics Limited ($934,000; subcontractor: Connaught Laboratories)

This program concerns microencapsulation of beta pancreatic cells. In February 1987, the results of an experiment conducted on board a KC-135 airplane made it possible for CAL to modify the design of microencapsulation equipment. The company is currently developing technology for the study of fluid dynamics in droplet formation in microgravity.

25046

Enichem Establishes New Research Center in Italy

3698m421 Milan INDUSTRIA OGGI in Italian No 15, May-Jun 88 p 37

[Text] New Research Center—Enichem Tecnoresine recently inaugurated a new research center with interesting development programs, as part of the Ferrara plant (which is where the ABS and low-density polyethylene manufacturing systems are also located).

The facility, which will cover a surface area of over 4,000 m^2, 3,000 m^2 of which will be used for laboratories, currently has a payroll of 65. The total cost of the facility was 9 billion lire. The center works on behalf not only of Enichem Tecnoresine but also of Enichem Anic and Enichem Agricoltura.

The strength of the center is the research for development and for process innovation in the production of ABS and polyolefins and the development of new products, as well as special studies aimed at cutting the operational costs of the ABS plants at Ravenna and Ferrara.

Studies for a new process for future production of ABS are at an advanced stage of completion. This process is based on new operating structures that will mean that a new pilot plant will be constructed within the end of the year. A plant of this kind is already being constructed for high-performance catalysts for the sector of polyolefins.

Special attention is being paid to the development of new types of ABS which will make it possible to enter new market sectors, as well as to a study of the possibilities of mixing ABS with other products manufactured either by Enichem itself or by partners of the company. In connection with polyolefins, on the other hand, the Ferrara center is working in conjunction with the group's research units to develop new processes and to study improvements to the products used in the various sectors. One wing of the research center has been set aside for machines capable of faithfully reproducing the manufacturing phases right up to the stage of the finished product. These operations make it possible for the Enichem laboratories to carry out in-depth studies of problems encountered by users as well as to develop concrete solutions to processing errors in plastics. This facility houses machines for injection molding, presses, and machines for monofilament and rotary extrusion.

The laboratories are excellently equipped, with laboratories for chemical and physical analyses, rooms for electronic microscopy with transmission to a remote display, and an interesting system for studying viscous/elastic behavior in the solid state.

In the Enichem center in Ferrara in-depth studies have begun on the use of plastic materials in agriculture, because these have recently proved to be essential components in completing the action of other elements such as pesticides, fertilizers, etc. in the areas of irrigation and coverage.

Recently, in collaboration with the research being conducted by Enichem Agriocoltura, an innovative plastic tube has been developed for microirrigation and fertiirrigation. This tube decomposes once the treatment for which it has been used has been completed.

The future programs of the center, to be implemented in parallel with a further increase in the number of employees, include an increase in the amount of research being done on the recycling of plastic materials; the preliminary phase of this research is already in progress.

During the inauguration of the center, the mayor of Ferrara, Roberto Soffritti, announced the opening of a graduate school on polymer sciences to be located in Ferrara, as well as the creation of an institute for ecological research and plastics research.

Mario Artali, president of Enichem Tecnoresine, and Antonio Sernia, president of Enichem, who stressed the role of Enichem in the sectors of technopolymers and advanced materials, were to have been accompanied by Enichem president Lorenzo Necci who, unable to attend because of illness, was the "absent guest of honor." On the same day, those attending the inauguration received a press release issued by Mr Necci announcing that the government had given the go-ahead to the Enichem-Montedison agreement. In this press release, Mr. Necci emphasized the importance of the specific strategy pursued in recent years by Enichem (whose balance sheet has shown a profit for the second year running), as well as the need to examine with due care and attention the possibilities opened up by the merger between the two industrial groups.

08616

French Create Aeronautics Association for Titanium Research

3698A285 Paris FRENCH TECHNOLOGY SURVEY in English Jun 88 p 15

[Text] As part of the technological battle for titanium and its alloys for aeronautical and aerospace applications, the French Scientific Research Center (CNRS) and French industry have pooled their efforts by creating a scientific group called "Titane." It includes five industrial firms, five university laboratories, the CNRS and the DRET (French Ministry of Defence's Armament and R&D Delegation). The firms involved are Aerospatiale, Cezus, C3F, SNECMA and TurboMECA.

The annual consumption of titanium is about 8,500 metric tons a year in Europe, of which more than 2,500 tons are used in France. It can be broken down into 60 percent for aerospace applications and 40 percent for sea water and other industrial uses. Research into thermomechanical processes and structural transformations of the alloy TA6V (Ti-6 percent, Al-4 percent V) and new alloys requires basic research of particular interest to aviation, engine, smithing industries and Cezus production. The aim is to study the relationship between thermomechanical treatment and microstructures (interpretation and modelisation) and between microstructures and properties aimed at improving, for the latter point which is of concern to the industrial sector, the strength, resistance and propagation of short fatigue cracks, creep strength, etc.

AEROSPACE, CIVIL AVIATION

ESA Chairman on European, FRG Post Ariane 4 Launch Space Policy

36980344 Hamburg DIE ZEIT in German 24 Jun 88 pp 8-9

[Interview with ESA Chairman Reimar Luest by Dieter Buhl and Wolfgang Hoffmann; date and place not given; first two paragraphs are DIE ZEIT introduction]

[Text]

DIE ZEIT: Last Wednesday the Ariane 4 began its maiden flight into space from Kourou in French Guiana. Does this mean the Europeans are catching up with the space powers America and the Soviet Union?

Reimar Luest: Europe can certainly compete.

DIE ZEIT: Professor Luest, the very first Ariane 4 launch was successful. After many failures on similar occasions in the past, this time there was a problem-free premiere. Have the Europeans finally formed an alliance with the heavens?

Reimar Luest: Even before the American's tragedy with their shuttle, the Europeans had managed to attract half of the world market for commercial satellite launches, much to the surprise and indignation of the Americans. With Ariane 4 the Europeans have a launch vehicle on the world market that can put a much larger payload in space than before. This is necessary since data communications and television satellites have increased in performance, weight, and size.

DIE ZEIT: How do the ESA rockets fare in comparison to those of the Soviets and the Americans? Is Western Europe on a par with the other space powers with its launcher systems?

Reimar Luest: We understandably do not have a clear picture of the performance level of Soviet rockets. As for the Americans, we know that they want to introduce the Titan, the Delta, and the Atlas Centaur into the commercial market. The Ariane 4 can certainly compete with these three rocket types—as long as the value of the dollar does not give us problems.

DIE ZEIT: Europe now intends to become a competitor in manned space flight. But is it possible to justify sending men into space—however fascinating that may be—while we are smothering in garbage on earth? And, for that matter, can we afford such extremely expensive space projects?

Reimar Luest: You are comparing things which are not comparable. Obviously, there remains much to be done on earth, and we certainly need significant funds for that. But how can the money which is spent for space and for manned space travel be compared with that, for instance, which is spent in Europe for agriculture; the annual public outlays for that are more than all the funds planned for space travel in the long-term European program through the turn of the century.

DIE ZEIT: Under the circumstances, wouldn't it be more reasonable to seek a division of labor with the Americans and perhaps even with the Soviets? Shouldn't the Europeans concentrate more on developing the most advanced satellites and space stations instead of building their own extremely expensive rockets?

Reimar Luest: At the beginning of the seventies, discussions about this were held with the Americans. At that time the Americans were not willing to guarantee that they would launch every commercial satellite, and especially satellites in the information and television sectors. Because this was a market in which the American firms had an uncontested monopoly.

DIE ZEIT: That they wanted to guarantee?

Reimar Luest: Yes. However, Europe cannot tolerate such a monopoly. I believe that in retrospect the decision made in 1973 to develop and build the Ariane has proven to be absolutely correct. Europe has thus become competitive in a sector which European industry cannot simply leave to the Americans and the Japanese.

DIE ZEIT: Then shouldn't Europe divorce itself completely from the Americans in space travel?

Reimar Luest: What is important is that we in Europe are competent in all critical areas and can act autonomously if need be. That does not however mean that we want to do everything alone. In those areas where agreements with the Americans are possible, we should in fact be open to agreements and to cooperation.

DIE ZEIT: Per capita, the Europeans spend approximately one-twelfth the amount that the Americans spend on space flight. Under these conditions, how does Europe intend to cover the same area—launch systems and space vehicles—as the Americans?

Reimar Luest: I would like to answer that using the example of scientific satellites. The ratio of outlays there is approximately one to eight, that is, America spends approximately eight times as much as Europe does. Despite the limited involvement it can compete selectively. Thus, the area of gamma-ray astronomy clearly belongs to Europe, and Europe has also taken the lead in the area of x-rays. The same principle also applies, for example, to the development of the Ariane which has shown that we can be fully competitive with the Americans with a rocket which is appropriately adapted to the demands of the market.

DIE ZEIT: All of this applies to unmanned space flight and to the legitimate and indisputable success of the Europeans in this field. Things look a little different in terms of costs in the realm of manned space flight because it requires a far greater financial outlay due to the high cost of safety.

Reimar Luest: Europe entered the field of manned space flight a long time ago and has attained competence there: with the development of Spacelab and the two missions in which Europeans participated, particularly with the German D1 mission.

As for manned space flight, the first question to ask is: Do we need humans in space or not? And what will it be worth to the Europeans to have a foot in the door here? Then we have to see whether this can be accomplished with Europe's limited funds.

More people live in Europe than do in America; the population of the ESA member countries alone is greater than that of America. Our gross national product is not yet as high as that of the Americans. Still, it is difficult to understand why we should not make outlays comparable to those of the Americans for modern technologies. First, we have to answer the question of how much we Europeans as a group are willing to spend to develop technologies, in other words, to secure the future. Only then do we come to the question of how much of this money should go to space flight and, in turn, how much of that should go to manned space flight.

DIE ZEIT: But for the Americans, expenditures for military and civilian purposes in space are being interwoven.

Reimar Luest: Very much so.

DIE ZEIT: Should civilian and military expenditures ever be combined in the European space program as well?

Reimar Luest: The ratio of per capita spending on space between Europe and America for the civilian sector is one to eight, as mentioned. If you include the military sector along with the civilian, the ratio of per capita spending on space between Europe and America amounts to 1 to 16 or even 1 to 20. Shouldn't we in Europe ask that question in another way: Shouldn't we—since fortunately we spend relatively little for our defense and, in particular, such a small portion of our research outlays for the defense industry—make sure that at least in other areas we can provide European industry with high technology so that it can remain competitive, especially with American industry? Basically however, the outlays that go to industry in America for research and development in the military sector, especially in the aerospace and electronics industries are disguised subsidies. The question therefore arises of how we in Europe can compensate for that. I would be the last to say that we in Western Europe should intensify our military expenditures. The outlays for space are, however, only a small portion of the amounts that go to industry for research and development. Of course, it is also possible to ask: Is this the best field in which to achieve the greatest impact? For there are other research fields, information technology, for example, which promise even more diverse yields. But the problem resides in the search for reasonable tasks in which Europeans can combine their efforts. And it has been clearly demonstrated that the interest in space technology is especially great, and a model for European cooperation is emerging in this area.

DIE ZEIT: There are many who say that precisely because the Americans invest so much in defense and space, they have lost their competitiveness in the high technology fields. Doesn't a similar fate await Europe if too much money is spent on space research?

Reimar Luest: I don't know whether American industry is really behind. America is a domestic market and American industry is primarily focused on this domestic market and not so much on export, whereas we in Europe, the FRG above all, must repeatedly create and maintain an export market for ourselves. Therefore, it is quite crucial that our European industry constantly remain at the most advanced level.

DIE ZEIT: In concrete terms, what has space travel accomplished so far for humanity in the way of important knowledge and new techniques?

Reimar Luest: In the area of science, space travel can no longer be done without. In the future, we will never again be able to do without observation from space in our knowledge of the universe, and even of the earth.

DIE ZEIT: Is this knowledge which can also be used in the economy?

Reimar Luest: No, astrophysical findings primarily have purely scientific significance. In contrast, the results of observation of the earth and its surroundings absolutely have economic significance. The greatest economic return is in the field of telecommunications—telephone, radio, and television. In this area the citizen will never fully comprehend how much comes to him at home via satellite. He simply has the expectation that he can immediately experience every event that takes place anywhere on the globe, be it in sports or in politics. We can no longer do without the satellites for this, and they will become even more important when it is possible to receive direct satellite broadcasts in every home.

This global communication already has a significant volume for the economy. Expenditures in space alone amount to a total of $5 billion per year. The ground facilities are 10 times more.

DIE ZEIT: $50 billion?

Reimar Luest: Yes, that is the approximate figure.

The third area is just beginning to develop: earth observation. In this area, I am absolutely convinced, for example, that we will achieve reliable weather forecasting only with the combination of observation from space and direct feed to large computers. No one can yet estimate what it would mean to the economy to have a halfway certain weather forecast, four or seven days in advance, for example. A developing country like India is already using this potential of earth observation and the knowledge gained from it about monsoon precipitation, for example, for harvest forecasting. The observation of the earth from above will also significantly impact environmental monitoring and the prevention of environmental damage. And it will be of great economic significance for long-term climate research as well.

DIE ZEIT: All the examples and findings you are citing can be achieved with satellites. Why then is the outrageously expensive quantum leap to manned space flight necessary?

Reimar Luest: Right now, that is a fundamental question: Do we believe that even future capabilities can ultimately be utilized without man, especially when we are planning to put a actual laboratory in space? I confess that I personally was always rather hesitant about whether we should go into manned space flight. Most satellite projects will and should continue to be carried out unmanned; in general, everything that can be taken care of by robots should in fact be done by robots. However: Just as we will have no fully equipped robotic factories on earth in the next 20 to 25 years, there is certainly a job for men in space until that time.

DIE ZEIT: Industry first was interested in materials research and materials production in space. Later this interest waned. Is it really true that we can do a lot in space which is impossible on earth?

Reimar Luest: I have always, even when I was still exclusively responsible for basic research, considered it particularly difficult when scientists used the argument that something would be economically useful at some time. Therefore, I also consider all the arguments that we can ever set up production sites in space to be almost dishonest. I certainly do not see that yet.

Nevertheless, there is much to be said for establishing a research laboratory in space. If we then took advantage of weightlessness in a laboratory for materials research, for studying hydrodynamics, biology, and the life sciences, those would all be research projects in which the possibilities would be discovered. Let the future decide whether something would come of it later in terms of business. We certainly will not know this before the turn of the century.

DIE ZEIT: Columbus is the next large European project. What concrete knowledge do you expect to gain from this project?

Reimar Luest: The Columbus program is a European project which envisages participation in the American space station. Our expectations are that we can move further into using microgravity research and open up capabilities for better servicing or repairing of astronomical and other satellites from the space station.

DIE ZEIT: When will Columbus be launched?

Reimar Luest: The Americans intend to begin construction of the first section of the space station in 1994. The European manned laboratory is to be launched and docked in 1996. After that, the polar platform is to be placed in orbit and the free-flying laboratory in 1998. In about 1998/99 the spaceplane Hermes should also be launched.

DIE ZEIT: Is it not possible to skip the Hermes project and move directly into the future technology of the reusable spaceplane?

Reimar Luest: I considered it a technically excessive demand and hubris to believe that we in Europe can do something better and faster than the Americans in this area. When I think about the space glider Saenger, I find such a project inconceivable without an intermediate step with which to first gain some technical experience in the supersonic field and in reentry into the earth's atmosphere. I see the primary advantage of Hermes as gaining practical experience.

DIE ZEIT: One of the major reservations in connection with Columbus is that this project could also be used militarily. The Americans certainly have that in mind. Are the Europeans immune to also using Columbus for military purposes?

Reimar Luest: The ESA Convention clearly states that we can only work on projects that are intended for exclusively peaceful purposes. That is the view of all ESA member countries, and these include even the neutral countries of Sweden, Austria, and Switzerland.

As for the military exploitability of Columbus by the Americans, it is expressly stated in the treaty that the space station is a civilian project. The problem lies in the interpretation of what "peaceful purposes" are. It is however totally impossible that any weapons or actual military device could be deployed on the space station.

In this connection, the much more problematic issue of what is meant by "military research" remains. Is, for example, money from the Pentagon for military use per se. There are differences of interpretation of this.

DIE ZEIT: Wouldn't it be more reasonable in the final analysis if Western Europe on the way to security policy independence also worked independently in space?

Reimar Luest: First, I believe that not only in the area of space technology, but in many other areas, particularly in connection with information technology and electronics, that one can quickly transfer everything that is used in the civilian sector to the military sector. And, second, what would actually prevent us Europeans from ultimately developing our own military reconnaissance satellite? I consider it virtually intolerable that we in Europe have to depend on what information from space the Americans make available to us.

DIE ZEIT: You are seeing the Western Europeans in joint complex activity. In this kind of work, how do the diverse mentalities and experiences complement each other?

Reimar Luest: It is one of the most impressive experiences of my job that it is actually possible to have European teams in our technical center in which Italians, Frenchmen, Germans, Spaniards, and Britons work together. They all speak a common language, BE, broken English, and they understand each other.

And it is obvious that the temperaments and mentalities complement each other: The French radiate tremendous optimism even in the area of technology, and they always have marvelous ideas. The Germans see to it that we first verify whether these great ideas are also feasible. The Italians have outstanding engineers with a gift for inspired improvisation, and they are always good for surprises. The Britons contribute conservatism, so to speak. And then there are the Scandinavians who often have a different point of view and also reflect a different outlook from the Italians and the Spaniards based on social consciousness. All of this is an astonishing mixture, and is becoming more complementary as the friction wears off.

DIE ZEIT: Nevertheless, one sometimes has the impression that when ESA projects work, the French were in charge, but when failures occur, it was more of an international undertaking. Is this a mistaken impression?

Reimar Luest: No. It is accurate with regard to the Ariane. But to be fair we must also add that until now the French have borne 60 percent of the developmental costs—in the future it will no longer be that high. The French had the courage to pull off the Ariane, and the French population considers the Ariane its project. That also finds expression in the fact that Ariane launches are even broadcast after midnight by at least two television stations in France, and the prime minister is also there at night. That is truly a French passion.

One thing is frequently forgotten: The successes and the failures of Ariane are in public view. The ESA, that is, European industry has carried out 22 satellite projects to date, and all have worked, most of them with a service life considerably longer than was originally designed.

DIE ZEIT: The TV-Sat did not work.

Reimar Luest: This Bundespost project is not an ESA project.

DIE ZEIT: Do we need a German NASA, the much-discussed DARA (German Space Agency)? Or would it not be much wiser to reinforce what you have helped to build and have just described and not create additional frictional surfaces by means of national space agencies?

Reimar Luest: From the standpoint of the ESA, it is always good when we have a member country that knows what it wants, that is competent, and can thus help us in the different committees. I assume that that would be achieved with DARA.

DIE ZEIT: Professor Luest, we have subjugated the earth and ravaged it, perhaps caused it irreparable damage. Are we now repeating our sins in space?

Reimar Luest: First, I believe that we have become much more sensitive to the issues of environmental pollution and environmental destruction, we will make appropriate sensitivity prevail in space. Second, space is of course much larger than the small surface of our earth so that the danger of contamination is not present to the same degree. We are however taking this into consideration and have established a special committee to investigate what happens to the remains of satellites. The great

attention to environmental protection in space has already been demonstrated in the moon flights. The concern for the "Planet earth" also has great value at ESA.

12666

ESA Approves Construction of Infrared Space Observatory

3698M347 Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 477, 13 Apr 88 pp 12-13

[Text] The European Space Agency (ESA) has finally approved the construction of the largest European research satellite thus far, the Infrared Space Observatory (ISO). Over 60 predominantly European scientists, including researchers from the Max-Planck Institutes for Astronomy, Extraterrestrial Physics, Nuclear Physics and Radio-Astronomy, are working on the development of the ISO satellite, whose total cost will amount to about DM1 billion.

The construction of this satellite poses an unusual technical challenge even to European industry: the space observatory will be used to study the invisible infrared (heat) radiation of cosmic objects in the range between visible light and radio waves—in wavelengths from 200 micrometers (thousandths of a millimeter).

In order to record this infrared radiation, the monitoring equipment with all its sensors must be brought to the extreme low temperature of 1.8 degrees over absolute zero. This will be achieved by equipping ISO with a 2,300 liter-tank of superfluid helium, which should ensure cooling for at least 18 months. The satellite as a whole weighs 2.3 tons and it is over 5 meters tall.

The radiation detected by the telescope will be conveyed to four measuring instruments. These instruments, which are also called "experiments," are each being developed under the supervision of a scientist ("principal investigator") from France, Great Britain, the Netherlands, and the FRG, within the framework of international cooperation among different groups of scientific institutes. Financial support is provided by national space programs.

France's Aerospatiale, selected by ESA as the general contractor responsible for the construction of the ISO satellite, has already given technically advanced contracts to German enterprises: Munich-based Messerschmitt-Boelkow Blohm (MBB) and Linde AG will develop the costly ISO cooling system, while Hanau-based Heraeus GmbH will manufacture the blanks for the quartz lightweight-mirror for the 60-cm telescope. AEG will produce the solar cells for energy supply.

The Max-Planck Institute for Astronomy in Heidelberg, under the leadership of "principal investigator" Prof. Dietrich Lemke, will provide the major West German contribution among the four ISO experiments, namely the measuring instrument "Isophot" (ISO-Imaging Photopolarimeter). It is a highly sensitive photometer, i.e., a radiation receiver that measures the brightness of cosmic objects in the infrared range but also determines the prefered vibrational direction (polarization) and performs a spectroscopic analysis to determine the presence of different lengths. Furthermore, it is the first instrument to take pictures in the range of the sky's longest infrared wavelengths (200 micrometers). The astronomers of the Heidelberg-based Max-Planck Institute are working on this project together with their colleagues of the Max-Planck Institute for Radio-astronomy in Bonn. Great Britain, Denmark and Spain have provided major contributions to this experiment, above all to the development of the computer and related software for simulating these measuring instruments.

West German scientists, the "Infrared Group" of the Max-Planck Institute for Extraterrestrial Physics in Garching, Munich, are also working on another ISO experiment, the SWS (Short Wavelength Spectrometer), which is to be developed at the Laboratory for Space Research in Groningen, in the Netherlands, under the supervision of Thijs de Graauw. Both instruments are financially supported by the BMFT [Federal Ministry of Research and Technology] within the framework of the FRG Government's space research program.

The Federal Ministry of Research and Technology (BMFT) has selected Dornier System, in Friedrichschafen, as the prime contractor for "Isophot." Major parts such as the instrument optics and all mechanical components, which will have to be mobile at an extreme low temperature, thus requiring new types of motors and actuating drives, have been given to Carl Zeiss, in Oberkochen. Frankfurt-based Battelle will supply the extremely sensitive infrared sensors, while Louvain's IMEC (Belgium) will produce the required special electronic components for them. A technological breakthrough will be needed to achieve these objectives: traditional transistors as well as most electronic components fail in the cold produced by superfluid helium.

8802/08309

ESA: Changes Continue in Designs of Hermes, Polar Platform

36980336a Stuttgart FLUG REVUE in German Jun 88 p 25

[Article by Goetz Wange: "Weight Loss in Space"]

[Text] Many questions could not be answered at the ILA in the area of space flight. As a result, the orbital glider Hermes is to be completely redesigned once again and a definitive shape is still being sought for the polar platform. Good ideas are needed.

The European space industry is finding it more difficult than expected to put its large-scale program into place. The technical design has been definitively established only for the heavy payload launcher Ariane 5. The liquid booster rockets which are the subject of constant discussion from the point of view of safety in manned missions will not be used instead of solid-fuel rockets, for this reason, according to Juerg Feustel-Buechl, ESA director for space transport systems. "The problems which result from the additional installation of the ejectible crew cabin must be solved within the framework of the Hermes program, not for Ariane," he commented, providing insights into the most recent developments.

The orbital glider will remain at a payload capacity of 3 t, but the weight of Hermes is to be reduced for the return flight to earth. The reason has to do with the limited load capacity of the wings. The solution currently being discussed is as follows: the L5 upper stage of Ariane will not be separated during the climb into space, but only after separation of the man-tended free flyer from the orbital glider Hermes. This will allow a section of the payload compartment of Hermes to be shifted to the upper stage. On the return trip, defective components, batteries and like materials are to be stored here, which then can be discarded as refuse with the upper stage. In this way, Hermes will carry a returnable payload of only about 1.5 t.

Hinged doors on the top side of the fuselage are to be eliminated. The radiator surfaces used to disspate heat, which were originally mounted on the inner side of the flaps, are to be moved to the stern, where they will also be lost upon separation of the L5 stage. The combination of docking supports and exit hatch is moved behind the ejectible cabin section and integrated into the passageway between the cockpit and the payload module. This means also that Hermes will no longer dock at the space station with its stern.

Names for Columbus Components: Castor, Pollux, Helena

A decision has been made in the Columbus program to make the many different elements more readily recognizable by giving them their own names. The laboratory module docked at the international space station is now called "Castor," the man-tended freeflyer "Pollux." For the polar platform, a name—Helena—has been selected, even though a technical solution remains to be found. The British are once again taking part, but with a share of only 5.5 percent of the entire Columbus program they cannot maintain their claim of leadership for the polar observer. The ESA has commissioned the French firm of Matra to undertake a parallel study intended to clarify whether an extended SPOT platform is possible. The report is due by December 15. The firm of Dornier will probably have to wait until then; the firm also entertains well-founded hopes of becoming the principle contractor for the 10 ton polar platform. A 2 ton instrument payload is being targeted at present.

Several questions remain with regard to the control centers that will be involved in the Columbus element under the leadership of ESOC in Darmstadt. According to Chairman of the Board Walter Kroell in Hanover, DFVLR expects to be awarded the contract both for the docked module as well as for the freeflying laboratory. At least in the case of "Castor," this appears doubtful, especially since a decision has been reached to have the engineering support center for the docked module furnished in Turin. An additional factor is the role that NASA will assign to these sub-control centers.

MBB Receives Satellite Contract From China

It would have been helpful if Germany had its own space agency when it came to defending German interests. However, DARA will continue to remain on the drawing board. In any case, the organizational solution proposed by the BMFT is encountering criticism on all sides, even from other governmental agencies. Up to now, only a small combat force for space flight, split off from the BMFT, seems to have emerged from the fray.

At the ILA, MBB announced that it had been awarded a contract from the China Great Wall Industry Corporation. According to the terms of this contract, valued at DM 51.2 million, the German space flight company is to assist in the development of the communications satellite DFH 3. In addition to support for the Chinese Academy of Space Technology (CAST) in system definition, the complete onboard antenna system and the mechanical portion of the solar generator is to be supplied by the Ottobrunn company.

Cooperative activities with the Soviet Union were announced. These include joint technology programs as well as experiments on board the space station Mir. MBB-ERNO was commissioned by BMFT to look into all necessary relevant conditions. If the outcome of the current study, which bears the the working title MIREX (German Experiments on the Space Station Mir), is positive, initial experiments could go on board by the beginning of 1991. Promising candidates are high-precision thermostats and equipment for interdiffusion in salt smelting. An indication of the outcome could be a cooperation in which the DFVLR has already received a gratis invitation to take part in a space flight under the aegis of a collaboration with the Soviet Academy of Sciences.

12792

Microgravity Research Projects Submitted to BMFT

3698m432 Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German
No 479, 13 May 88 pp 7-8

[Unattributed article: "Utilization of Weightlessness"]

[Text] According to current plants, the European space station Columbus, consisting of a laboratory docked at the

international space station and an additional freeflying laboratory which is visited and serviced periodically by astronauts, is to be available by the middle of the next decade. The completion of this research facility will mean a dream come true for many scientists: a permanent laboratory in space, something that is an essential prerequisite for carrying out research under conditions of weightlessness, since this type of research is conducted almost exclusively by means of experimentation.

To be sure, SPACELAB missions and ballistic rocket flights also offer opportunities for research under conditions of weightlessness and have been successfully implemented, yet the total sum of research time led to values which did not permit reliable research. The permanent COLUMBUS-laboratories are intended to supply such a wide range of resource possibilities for experimentation in space that plans and preparations must be undertaken even now for efficient utilization.

In addition to organizational measures which include development of an earth-based infrastructure to operate the space laboratories and availability of astronauts (the European Astronaut Training Center will be located in Porz-Wahn as an ESA-facility), corresponding arrangements must also be made in the field of utilization disciplines. For this purpose a discussion was recently held at the Federal Ministry for Research and Technology with specialists from science and industry on the topic "Utilization of Weightlessness." The purpose of the meeting was to undertake an assessment of current activities as well as to formulate suggestions and recommendations for future planning.

The experts reached the following conclusions:

- Research under conditions of weightlessness is a multi-disciplinary, heterogeneous research which opens up new possibilities for a number of formerly scientific disciplines. At present, this involves basic research which—although far remote from any industrial application—is a necessary prerequisite for possible industrial utilization at a later date.

The expansion and consolidation of the corresponding scientific program with the inclusion of relevant scientific organizations will be further advanced. The scientific quality of the research is assured by established review procedures and the involvement of neutral advisory committees. Furthermore, a BMFT circle of experts has been set up to establish priorities for the individual research fields.

The concentration of scientific know-how is supported by so-called Centers of Excellence. Since research under conditions of weightlessness involves basic research, international cooperation is to be sought wherever possible.

- The mid- to long-term goal of all pilot projects and demonstration projects is, however, the industrial utilization of weightlessness and of the space laboratory, whether manned or fully automated. This does not simply mean production in space, but also increasing knowledge via space in order to improve terrestrial products and processes. A first step to stimulating industrial utilization consists is the implementation of allied projects in which technical schools, universities and industry collaborate. This is already successfully underway in many cases.

- The preparation of experimental studies in the space station requires even in advance an adequate number of flight opportunities and experimental facilities. These are provided by a number of various projects which are implemented according to experimental requirements (period of weightlessness, energy, mass, manned or fully automatic mode). Several examples from the national program that could be mentioned here include the gravity tower in Bremen (under construction), the ballistic missile program TEXUS, SPACELAB missions such as D1 and D2 and the freeflying platform EUREKA within the framework of our participation in the programs of the European Space Agency (ESA).

In terms of experimental facilities, a number of devices already exist which are suitable for use in fluid physics and medical experiments. These devices which have already been tested or which are currently being tested form the basis for the development of devices which will be used at a later date in the space station.

International cooperation is also being sought with regard to flight opportunities and experimental facilities and, where feasible, it is being practiced as well. Approaches focusing on the involvement of the private sector, particularly in providing flight opportunities, must take priority over support from the public sector.

- With regard to the preparation of an efficient utilization of the space station, corresponding utilization and operational plans are being prepared in close cooperation between science and industry.

According to current planning, the realization of these tasks requires for the next 8 years (1988-1995) funding amounting to approximately DM 1 billion for the national utilization program as well as a German contribution of about DM 0.8 billion to ESA's budget to the year 2000, or a total of DM 1.8 billion. (By way of comparison, the three other utilization areas: extraterrestrial research, DM 2.4 billion; earth observation, DM 1.7 billion; telecommunications, DM 1.8 billion).

Research under conditions of weightlessness has been carried out for some 25 years and is therefore a very young branch of research, just a quarter of a century old. It is still in a phase of development and optimization and will advance only to the extent that experimental opportunities are available. Its acceptance in the scientific world is growing, but it will still take some time until access to the laboratory in space is a matter of course, as is access to a research facility on earth.

Further information can be obtained from DFVLR
Project Support Office
Chief Division PT/PM
Linder Hoehe
5000 Koeln 90
Tel.: 02202/601-2630.

12792

Airbus Industrie Studies Aerodynamics Using Production Aircraft

36980336c Stuttgart FLUG REVUE in German Jun 88 p 70

[Article by Helga L. Hillebrand: "Airbus Used To Measure Air Flow"]

[Text] No one is surprised any more on hearing that in the forefront of a new aircraft development, aerodynamics are studied on models in a wind tunnel, so that predictions for design can be made. Just the other way around, an Airbus-310-300 is now used to measure air flow, with MBB as responsible partner in this project. Instead of a model, a production line aircraft—more precisely, No 378—was used. The aerodynamic specialists did not place the aircraft in a wind tunnel—nowhere in the world is there a tunnel large enough—they simply had it fly equipped with measuring sensors and electronics, in order to draw inferences for wind tunnel models.

Even though this may sound somewhat wrong-headed, it nonetheless holds important significance for the future. Only limited information exists to date on the extent to which data measured on models in a wind tunnel can be transferred to the original. This project will fill the gap. On the basis of a comparison of results, it will make it possible in the future to achieve a better interpretation of wind tunnel measurements. Moreover, the data can be used as a basis for computer simulations.

Fifty-nine percent of the right wing surface of the A310-300 was covered with sleeves to measure air pressure. Also used were thermal films which, upon being heated to a certain temperature, are cooled by the air current; these changes can be used as an indication of the speed of the current. The results can of course be transferred through computer transformation to other aircraft, as well.

The flight tests were done with various launch weights, flight altitudes and speeds. The project ran within the framework of the civilian European research cooperation GARTEur, in which England, France, the Netherlands and the FRG are participating.

12792

ERS-1 Remote Detection Satellite Described

3698A281 Paris LA LETTRE HEBDOMADAIRE DU GIFAS 16 Jun 88 pp 1-2

[Unattributed article: "The ERS-1: Europe's First All-Weather Remote Detection Satellite"]

[Text] The European Space Agency's first teledetection satellite, the ERS-1, will be orbited early in 1990. Life span is expected to be two years. The ERS-1 was preceded by the American satellite Landsat in 1972 and the French Spot in 1986. It will be the first remote detection satellite equipped with an active hyperfrequency instrument (AMI) operating on two different modes: wind diffusion meter for delivering data on wind speed and direction at sea level and SAR [Synthetic Aperture Radar]. The radar is an essential instrument because it can make an oblique scan over a 100 km wide band on one side of the satellite's ground margin. ERS satellites will also carry a radar altimeter which returns high frequency radio waves to the ground and record echos. This type of phenomenon surveillance concerns all the oceans and the polar regions and constitute a major contribution to world research on climates. The ERS-1 will be the trailblazer for a system of satellites that will start operating during the final decade of this century. It will also play a major role for the scientific analysis of oceans and submerged land, including the observation of oceanographic phenomena and the ocean bed, with geodesic and geodynamic applications, analysis of how ocean masses move, observation of the ocean surface, ocean bed topography, coastal formations, evaluation of the effect of environmental disturbances on continent masses and the preparation of operational applications in these directions. The ERS-2, second flight version of the ERS-1, should carry the same payload for the same mission. It will probably replace the ERS-1 in 1993, and continue its active life span for another 2 to 3 years. Aerospatiale and Matra are involved in the ERS program.

Kayser-Threde, Licenzitorg Sign Aerospace Cooperation Pact

3698M372 Bonn TECHNOLOGIE NACHRICHTEN-MANAGMENT INFORMATIONEN in German No 478, 27 Apr 88 p 4

[Text] Munich-based Kayser-Threde GmbH is the first Western partner of the Soviet Union in the area of astronautics. According to a company spokesman interviewed by news magazine REPORT (2/88 issue) a contract has been signed with the Soviet foreign trade association Licenzitorg on an "option for flight opportunities with Soviet carriers."

According to Soviet press agency Novosti, the contract provides that between 1989 and 1992 Kayser-Threde will carry out three research experiments under microgravitation conditions aboard the Soviet space probe Photon. Reportedly the FRG and "above all the Bavarian government" are interested in manufacturing in

space substances that cannot be obtained under "terrestrial conditions." According to Novosti, while in the West there are 50 commercial satellites "waiting in line" to be launched into space, that will "pose no problems" in the USSR or in China between 1989 and 1992.

The service offered by the USSR is not limited to launch vehicles. Upon request, whole technological installations can be hired. The Space Commerce Corporation in Houston, Texas, has signed a contract with the Soviet space company Glavkosmos, but the American authorities have not yet given their approval. By contrast, Kayser-Threde has all the necessary authorizations, especially as no American technology is involved, Novosti reports.

/08309

FRG's Dornier Presents Own Saenger Version

36980336b Stuttgart FLUG REVUE in German Jun 88 p 70

[Article by Goetz Wange: "Saenger Variant"]

[Text] With the Saenger-D, Dornier is introducing a new variant into the hypersonic technology program currently receiving BMFT funding. Research will extend over a five-year period.

The German proposal for a reusable horizontal launch booster system—propagated by MBB under the title Saenger II—has now found international recognition. Basic elements include the hypersonic, aircraft-like first stage with air-breathing drive (liquid hydrogen and oxygen) as well as a piggy-back second-stage which reaches space driven by rocket motors. Both stages have wings and can therefore return to earth.

This new booster design, which cannot be realized before 2015/20, is expected to reduce anticipated transport costs for Ariane 5 by 75 percent. In order to define the technology requirements related to such systems, the Research Ministry in Bonn has established a National Hypersonic Technology Program (NHT).

In the preparatory phase, Dornier introduced its Saenger-D option in December 87. The essential difference as compared with the Saenger II proposal from MBB has to do with the operation of the air-breathing rockets and therefore with the mach number of the stages. While in the MBB design the entire system is accelerated to mach 7 before the rocket motor of the second stage is ignited at a height of 35 km and is then separated, in the Dornier proposal the first and second stages remain together even after the air-breathing engines are switched off. The speed of Saenger-D at this point is mach 5 or 6. The rocket engines of the second stage then take over the additional thrust, until optimal speed is reached for separation of the stages. A partial parallel operation of the air-breathing engines and rocket engines is conceivable. [Please refer to page 13 for schematic drawing of Dornier's Saenger-D]

The fuel for the operation of the rocket engines in the first phase prior to separation of the stages is taken from tanks contained in the still-attached first stage.

Dornier believes that the following advantages will be achieved as a result of the decoupling of the air-breathing drive after the point at which the stages are separated:

- The technology of the air-breathing engines can be contained with regard to reliability and cost. The intake cross section of the engine diffusor can also be reduced in size, which will be a favorable development in terms of structural weight.
- A safe and optimal staging can be achieved by the additional power of the rocket engines with their powerful thrust (even when staging is carried out only later).
- If the rocket engines experience difficulties on take-off, the upper stage will be flown back to the landing site.

Further details are to be clarified in a joint definition study undertaken by MBB and Dornier.

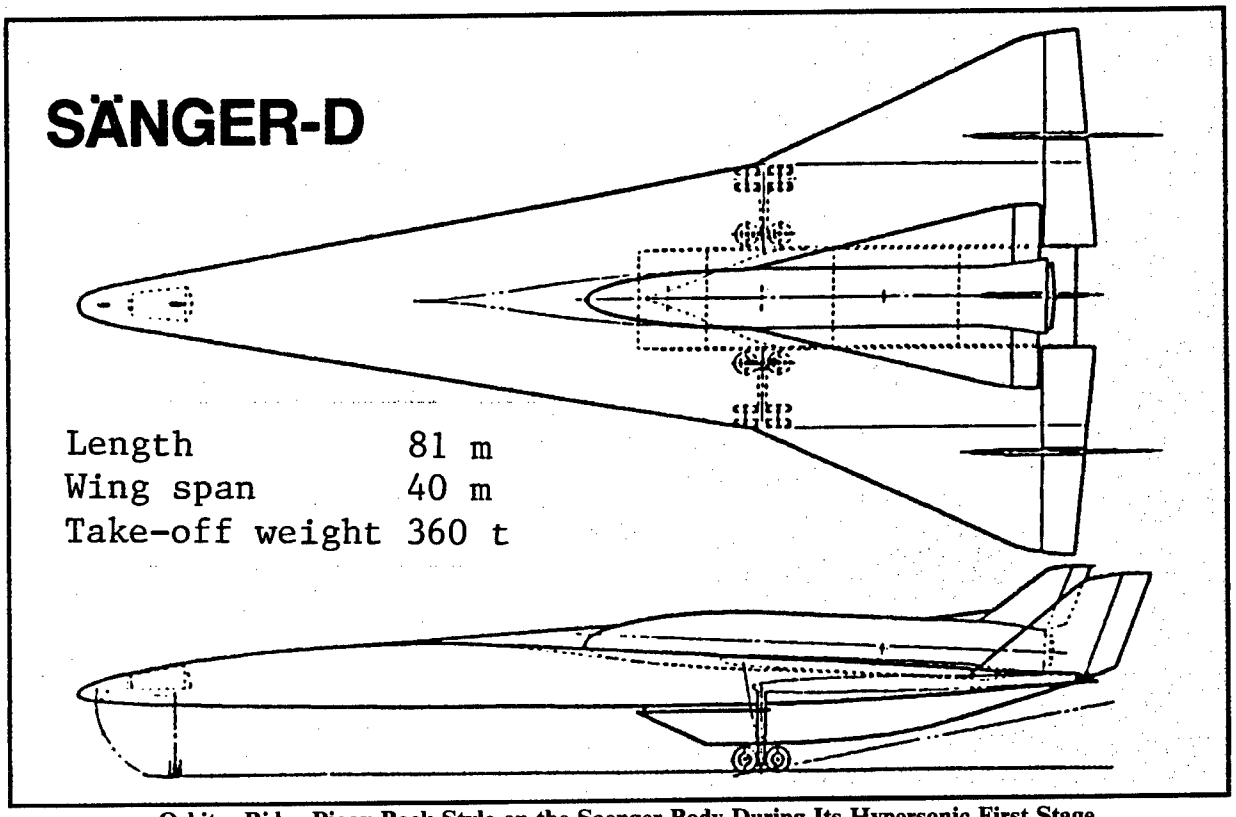
12792

Hispano-Suiza Scoops Rafale-D Power Transmission Contract

3698A282 Paris LA LETTRE HEBDOMADAIRE DU GIFAS in English 30 Jun 88 p 2

[Unattributed article: "Hispano-Suiza Power Transmission for Equipment of the Rafale-D"]

[Text] On 19 June, following stringent competition, AMD/BA [Avions Marcel Dassault/Breguet Aviation] selected Hispano-Suiza to supply the power transmission system for its Rafale-D. This will include accessory gear box and non-rigid linkage (shaft connecting engine box to aircraft gear box). This commercial success, won in cooperation with Turbomeca,represents an estimated Fr300 million and consolidates the position of Hispano-Suiza on a highly competitive market. Hispano-Suiza earlier supplied the first equipment relays and non-rigid linkage for the prototype Rafale-A. In the Rafale-D program, associated with the SNECMA M88 turbojet, Hispano-Suiza will be responsible for all mechanical power transmission for all equipment needed for operation of the aircraft engine. This is real European premiere.



Orbiter Rides Piggy-Back Style on the Saenger Body During Its Hypersonic First Stage

AUTOMOTIVE INDUSTRY

Japan's Nissan Developing European Strategy

3698A219 Paris CPE BULLETIN in French Feb-Mar 88 pp 10-11

[Article by R.B.: "Nissan Banks On Europe"]

[Text] Nissan's European engineering department in Brussels has begun developing new models to meet the needs of the European market. The company plans to market passenger cars with European specifications within the next 2 or 3 years to be competitive in the single European market of 1992. So far, the engineering department has been responsible for altering models from Japan to conform to the standards of individual European countries. After an exhaustive study of European ways of life, Nissan has concluded that the European department, in cooperation with its British and Spanish production centers, should take charge of all activities, from blueprint to prototype to production. Sixteen Japanese engineers are already in Brussels, and development teams have been sent from Japan to study local situations and hold talks with their European counterparts.

25046

DRIVE Program Formally Approved

3698A257 Brussels EC PRESS RELEASE in English No IP(88) 407, 29 Jun 88 pp 1-2

[Text] The Council of Ministers of the European Community today adopted the DRIVE programme—Dedi cated Road Infrastructure for Vehicle Safety in Europe—a collaborative research and development programme of the European Community. The Council decision carries over a period of three years, with a contribution of ECU60 million from the Community budget. This amount represents half of the cost of projects to be launched. The other half will come from project partners in the commercial, public and in the academic field.

DRIVE envisages a common European road transport environment, where drivers are better informed and "intelligent" vehicles communicate and cooperate with the road infrastructure itself. The programme follows a top-down systems approach which will enable sophisticated and effective traffic management and provide the basis for more comprehensive safety systems.

DRIVE seeks to create the conditions for the development of an integrated road transport environment, through pre-competitive and collaborative research and development in the field of information technology and telecommunications applied to road transport. DRIVE will entail: research, development and assessment of a

whole range of technologies, the evaluation of strategic choices of candidate systems and a very significant amount of standardization work.

DRIVE will bring together road users, research institutions, providers of broadcasting and telecommunications services, industry and road transport authorities. DRIVE has developed and will maintain close links with other European action in the domain. In particular it will include Community activity with regard to standardisation and common functional specifications relating to the development of advanced infrastructure systems.

The core of the DRIVE operation is a workplan which has been drawn up by the EC Commission in consultation with Member States, interested parties in industry and representatives of road user organisations.

The DRIVE work plan comprises features such as

- analysis of actors' requirements and functional specifications;
- analysis of traffic accident data;
- transmission technologies (micro-wave, infra-red, radio etc.);
- communication architectures and technologies;
- vehicle, road condition, weather and pollution sensors;
- radar systems;
- route guidance and journey planning systems;
- message and signalling systems;
- development of appropriate software;
- development of strategies for traffic management;
- human factors work;
- standardisation, particularly of communications protocols and interfaces.

On the basis of this work plan and following the Council decision the EC Commission will now prepare a public call for proposals inviting interested and qualified partners to submit project proposals. The call is expected to be published in the Official Journal early in July. A DRIVE proposers' day organised by the Commission's Directorate General XIII (Telecommunications, Information Industries and Innovation) on 27 June 1988 in Brussels showed that there is considerable interest in the subjects covered by DRIVE. More specifically the DRIVE proposers' day made clear that the interest and belief of relevant actors in transnational European cooperation continues to increase.

DRIVE projects require the participation of at least two independent partners in two different Member States. One of them must be a commercial enterprise. Following the example of other EC research programmes DRIVE also allows for partners from EFTA countries to collaborate in the programme.

The Commission requests project proposals to be submitted by endSeptember. The subsequent evaluation and contract negotiation should allow DRIVE projects to become operational towards the end of the year.

BIOTECHNOLOGY

European R&D on Protein Crystallization in Microgravity

3698A223 Paris BIOFUTUR in French
Mar 88 pp 32-36

[Article by J. Cornier and A. Plaas-Link of Intospace GmbH, Hannover: "Microgravity Protein Crystallization"; first paragraph is BIOFUTUR introduction]

[Excerpts] Following the encouraging results of initial experiments, protein crystallization in space has become one of the most important microgravity experimentation programs. This work could well open the door to the development of new medicines, vaccines, and molecular biochips. Jean Cornier and Andreas Plaas-Link summarize the advantages of working in space and review past and projected tests in Europe and the United States. (Established in Hannover in 1985, Intospace seeks to promote the commercial utilization of microgravity. Ninety-four firms from nine European countries, ten of which are pharmaceutical companies, hold stock in the organization. Intospace distributes information on microgravity to non-space industries and, in the strictest confidence, helps these industries perform successful tests in space. The company is presently coordinating about 20 tests which will be carried out on board Spacelab-D2 in 1992. Intospace is organizing growth experiments for semiconductor crystals on the Texus rocket probe this autumn.)

Lysozyme and Beta-Galactosidase

After conducting short-term (6 minutes) preliminary experiments on board the spacecraft to evaluate the diffusion process, the ESA [European Space Agency] integrated lysozyme and beta-galactosidase crystallization tests into the November 1983 Spacelab mission. While the structure of lysozyme is known and its crystallization on earth practically mastered, the structure of betagalactosidase is unknown at present. The promise of microgravity can be traced to the results of this mission, which was led by Dr Littke of Fribourg University.

In fact, the lysozyme crystals obtained were 1000 times larger than those obtained in control experiments on earth; the beta-galactosidase crystals were 27 times larger.

Furthermore, 10 percent of the lysozyme crystals formed without adhering to the walls and were of a greatly improved optical quality. However, these results could

not be replicated during the German D1 Spacelab mission in 1985, due to a technical malfunction. Finally, the rather specific experimental technique that was used limits comparison of the samples with those obtained on earth.

Future Missions

In 1990, the EUREKA [European Research Coordination Agency] platform will carry a cryostat[2] (Low-temperature thermostat-controlled chamber used on board Spacelab) derived from previous ESA experiments, and will perform tests over a 2-month period. The proteins involved will be: lysozyme/beta-galactosidase, rhodopsin, plasminogen/fibrinogen, alpha crusta-cynanin, tRNA synthetase, and bacteriorhodopsin. This mission will provide the possibility of using the attractive concept of "telescience," in which the operator on earth modifies the experiments by remote control, based on the video imagery received.

Installations have now been developed which should permit the simultaneous and automated crystallization of 100 to 150 samples. The European Columbus module could carry these installations when it links up with the U.S. space station in 1997. These installations could be set up 1 year later on board an automatic platform to be visited by astronauts every 6 months, providing excellent microgravity conditions (10^{-6} 9 compared to 10^{-3} in a manned station). In addition, the Intospace company is developing a simplified system to facilitate the simultaneous growth of more than 100 samples from solutions and crystalline germs in small flexible tubes. This system is being built in collaboration with space firms and users, research centers, and large European pharmaceutical companies. An 8-day flight is planned for mid-1988 on board a Chinese spacecraft, for recovery of the experimental module containing the precious crystals. Another mission has already been planned for 1989.

The CNES [National Space Studies Center], Aerospatiale, and the pharmaceutical companies Rhone-Poulenc, Roussel Uclaf, and Sanofi are jointly conducting a protein crystallization program in microgravity. In collaboration with CNRS [National Center for Scientific Research], CNES is responsible for finding flight opportunities. Aerospatiale is developing the equipment for the program.

There is a preference for dialysis methods, in which the protein solution is separated from the precipitant by a semipermeable membrane. These methods provide several advantageous crystallization conditions, in particular spontaneous modification of the precipitant concentration, highly stable physical conditions, and the possiblity of stopping crystal growth before landing to avoid the accompanying disturbances. An in-flight test has not yet been conducted. The first flight is planned on board the Soviet Mir station around 1990, since the initial project to test it on board the French-Soviet long-term flight in November 1988 was abandoned.

The difficulties encountered in crystallization cell design have resulted in a reassessment of the technical approach for this part of the equipment. Two approaches are being studied. The first uses a partially or totally automated device, to be made operational in an autonomous satellite. The other requires human intervention, i.e. a manned space station. Ground models have been developed, making it possible to predict the optimum crystallization conditions.

Conclusion

The first results, which have been briefly overviewed here, allow us to hope that we are about to solve the problem of crystallization in protein engineering, or, more simply, of understanding protein functions. Long-term projects can be said to be increasing, but the number of experiments remains small and results are fragmentary, which limits access to an approach based on the optimization of crystallization conditions. Companies (Intospace, Biospace) that sell microgravity to requesting biologists are speculating first and foremost on crystallization. The limiting factor is the number of accessible flights, and, of course, their cost (approximately $10,500 per sample for Intospace). But while the development of a space research program is time-consuming, often taking a decade, this is not much longer than the time required to develop a new medicine. The time has clearly arrived to consider the fundamental aspects of biotechnology in microgravity, to be ready for the space station era in the second half of the 1990's.

The CNES and French Pharmaceutical Companies

At the initiative of several French partners, an important multi-national purification project is being developed and should be presented at the next EUREKA Conference in Copenhagen in June. Matra, one of the project's promoters, has been joined by Roussel Uclaf, Aerospatiale, and the CNES, as well as by some Belgian and Spanish companies.

25041

EUREKA 'Labimap 2001' Project To Sequence Human Genome

36980338c Paris BIOFUTUR in French
May 88 pp 63-64

[Article by Jean Hache: "'Labimap 2001': A EUREKA Project on Molecular Biology"]

[Excerpts] To establish accurately the distribution of the 3 billion of chemical bases which form the human genetic inheritance, such is the ambitious human-genome sequencing project. Many researchers agree that such an approach is not enough, as identifying every single nucleotide in a DNA sequence will contribute little knowledge on its function. And it is essentially the functions of the genes that must be identified. It will therefore be essential to maintain a balance between

research aimed at identifying the structure of the human genome and other, more physiological but just as essential, research on how the human body and other living organisms work.

The identification of a genome sequence, however, still represents an essential and promising stage which should reinforce the investigative resources of traditional biological research. It will be accompanied by technological developments that will extend beyond human genome sequencing and will find applications in medicine and medical analysis (prospective medicine, cancerology, etc.) as well as in agriculture, the agrifood business or fraud detection. This is the context of the Labimap 2001 project.

A Joint Effort

The object of the Labimap 2001 project is to define, develop, produce and market an automated line to perform all the operations of molecular biology, and the reagents required for these operations. It involves stakes that are vital for European basic research as it faces the large scientific and technological programs implemented in other parts of the world, and it represents a concerted effort to promote the applications of molecular biology through parallel, simultaneous and interactive development of the instruments it uses.

The development, production and marketing of a complete line of automated instruments compatible with one another, and of the associated reagents, can take place only in a European context. This is why manufacturers and researchers decided to pool their efforts and propose a Eureka project. In France, these are Bertin and the Center for the Study of Human Polymorphism (CEPH); in Great-Britain, Amersham International PLC and the Imperial Cancer Research Fund (ICRF).

The Stages

A first predefinition stage will make it possible to select the molecular biology methods that will be used as a basis for development; to optimize them; to evaluate them, identifying in particular any roadblocks to automation; and, finally, to define the equipment that should be developed.

This stage will be followed by a development stage, then by a manufacturing/marketing stage that will be open to other European industrial partners (in Germany, Switzerland, Italy, etc.). Regardless of who makes them, all pieces of equipment will bear the same label so as to show that they are part of a complete line of compatible equipment.

The development of molecular biology and that of the instruments it requires are strongly interdependent. This accounts for the approach adopted for the project: researchers and technologists working in very close association.

Researchers will propose new methods to refine the operations, perform them faster, make them more reliable; these methods will be evaluated. In addition, the research will have the support of a whole network of world-level laboratories providing what amounts to a scientific watch on the development of molecular biology methods. **Technologists** will evaluate the automation potential of the various methods; they may question them, proposing alternate solutions that might simplify automation. They will also analyze sequentially the various operations involved in order to propose modules common to these operations and thus reduce the number of instruments to be developed and marketed.

This approach, in which researchers and technologists are associated, should enable European researchers not to depend on U.S. or Japanese technology to which they will gain access only after some delay—and therefore too late—at a time when technologies keep changing. As for European manufacturers, they will gain a foothold on the market for equipment that will be used routinely for many tests in hospitals and laboratories.

9294

GIBiP Final Recommendations on BRIDGE Program

3698m450 Milan CHIMICA OGGI in English
No 6, Apr 88 p 47-48

[Text] As written down in the charter the Green Industry Biotechnology Platform (GIBiP) is a cross section of the industry in Europe involved in biotechnology applied to plant breeding. Members of GIBiP are companies that dedicate significant efforts to plan biotechnology research.

GIBiP has formulated its opinion and recommendations on the priorities, general lines and trends in the BRIDGE-program [Biotechnological Research for Industrial Development and Growth in Europe], because it feels that the green industry sector will be a major implementator of the results of this program.

GIBiP trusts that this contribution will be duely used in the program-formulation for BRIDGE so that the trend of increasing industrial relevancy of the EC biotechnology programs, could be strongly carried through.

Conclusions

1—In connection to the plans of the Commission of the European Community to set up the BRIDGE-program for the period 1990-1994, GIBiP has assessed the priorities this program should have according to the needs and possibilities of the "Green Industry" in Europe. In this action it has concentrated on priority themes and areas for R&D.

GIBiP sees BRIDGE as a natural follow-up to BAP, the research and training program for biotechnology in the period 1985-1989. The evident success of this program in the area of plant (cell) biotechnology, as well as the fact that European R&D in this area is only beginning to show (agro) industrial impact and should gain further momentum, leads to the general recommendation that in BRIDGE high priority should be given to plant (cell) biotechnology.

2—GIBiP has analyzed the position papers of IRDACWP5-biotechnology and CEFIC/EBCG with respect to the BRIDGE program. With respect to the first paper it expresses its general support of the priorities recommended and the budget proposed. GIBiP feels that BRIDGE should be a program of target oriented basic research in biotechnology, showing a clear multidisciplinary character. In its opinion, so called "feasibility research" is not well placed in BRIDGE and would be more feasible in programs of a stronger development and demonstration character, such as the recently announced program ECLAIR.

GIBiP supports the general recommendations in the CEFIC/EBCG paper. To build a critical mass of top-level researchers, stimulation of transnational training is very important. GIBiP proposes therefore that at this moment still less glamorous areas such as plant regeneration, cell differentiation and plant-reproductive biotechnology should also get additional emphasis in the training subprogram.

3—On the basis of its own considerations as well as the conclusions of expert meetings on subjects related to plant (cell) biotechnology, GIBiP has identified three R&D areas of top priority for the BRIDGE program. A fourth area has even been ascribed a higher priority, but the general feeling was that this area comes already in the competitive domain and is therefore not well suited for BRIDGE stimulation anymore.

Three top priority areas for BRIDGE shoudl be:

—**Molecular physiology and genetics of sexual breeding**
The excellent survey of Professor Dickinson should be used as a guideline for further specification.

—**Control of plant (cell) development and differentiation**
In this area important blockages exist hampering practical application of results of molecular genetics and biology. New approaches and possibilities have to be explored and developed as classical R&D in this area is in a dead end now. GIBiP recommends to call for an expert meeting to specify new potentially successful approaches. Furthermore, as already said, this area should be the scene of dedicated training activities.

—**Structure, organization and function of nuclear and organellar plant DNA, biochemical and molecular approaches to enhance the quality of plant products**
One of the subareas in this large domain, which could get additional emphasis is the development of methodologies and new strategies to incorporate (with a high stability) new DNA/new genes into the genetic system of plant cells that have already differentiated. These could be meristem or early embryo cells.

An area that is gaining increased emphasis in many green industrial R&D programs and because of that clearly is not precompetitive anymore, is the area of mapping and molecular definition of quantitative traits. GIBiP stresses the importance of this area. Development of new general methodologies of importance here, should be stimulated. However, specific R&D work in this area, other than contextual initiatives to come to an European data collection in this field, is not recommended as a top priority in the precompetitive BRIDGE program anymore.

4—To enhance industrial involvement in the program and industrial use of the results, the format of the contracts for industrial participants in the program must be further elucidated with respect to the clarity of the conditions to be fulfilled. We agree with the EBCG standpoint that industrial participants should have first right of refusal with respect to exploitment of results.

If participating in groupings, the industrial partner should have a formally recognized position for advanced use of the results and information obtained.

In connection to the size of project groupings and the trend to establish European Laboratories Without Walls, GIBiP recommends to always limit the number of participants to the absolute minimum, necessary for effective and optimal project implementation and cooperation. GIBiP wants to make clear that in its opinion, the way in which the CEC programs until now have developed, clearly leads to an increasing bearing of these programs on private R&D. With respect to the above, and EBCG's consideration, in GIBiP's opinion this trend may show further progress in the future.

[Box insert, p 47]

Charter

Green Industry Biotechnology Platform

A cross section of the industry involved in biotechnology applied to plant breeding, represented by companies making significant plant biotechnological research efforts, decided to meet on a regular basis in order to discuss, clarify ideas, provide feedback and express opinions where and when necessary to relevant bodies in three areas of common interest:

1—To develop a common attitude towards biotechnology R&D in Europe in relation to the green industry.

2—To identify barriers and possible solutions with respect to European legislation on plant products, living matters and environment related to biotechnology, and to reach European harmonization.

3—To exert influence on public opinion in favor of biotechnology related issues of the green industry.

The group was established in Amsterdam, October 6th, 1987 and named:

Green Industry Biotechnology Platform

Definitions

Green Industry:
Industrial companies or enterprises producing and commercializing plants or parts (seed) thereof.

Biotechnology Platform:
Meetings organized by and for the member companies in which their representation exchange views on biotechnology related subjects in order to come to common opinions to be communicated to relevant external parties and organizations.

08800

Flanders Hosts Applied Biotech Forum

3698A186 Bruges BIOTECHNOLOGIE TRANSFER in Dutch Jan-Mar 88 pp 17-22

[Unattributed article: "Report of the Forum for Applied Biotechnology"]

[Text] On 1 October 1987, the first Forum for Applied Biotechnology [FAB] was organized by the Department of Agriculture of the State University of Ghent [RUG]. The organizers' goal was to provide a time and place where scientists, applied biotechnologists, technical sales representatives, and people from the service sector could meet to exchange information, identify research needs, and determine cooperation opportunities in the field of biotechnology in the broadest sense of the term. A second goal was to allow young scientists to gain international experience by familiarizing them with the atmosphere of an international congress and by offering them the opportunity to compare notes within their own research field.

Both goals were amply met: A total of 370 participants from 15 countries attended. Another positive aspect was that 52 percent of the participants came from research and education, 40 percent from industry, and 8 percent from government and the service sector.

The actual program included 3 introductory lectures; 47 visual presentations; and 35 papers, divided among 7 sessions highlighting one branch of biotechnology. Several interesting papers were presented by young scientists who were presenting their research findings for the first time to an international audience.

The plenary morning session was opened by Prof Dr Eng W. Verstraete. In a short introduction, he explained the goal and importance of this FAB.

The first speaker was B. Nieuwenhuis of the EEC, who gave an overview of biotechnology research and training activities within the Community. More specifically, he explained a recent research program involving the collaboration of different countries in the form of exchanges between laboratories.

The second speaker was Prof K. Luyben of the Delft Institute of Technology. He discussed recent developments in metabolite separation techniques during the fermentation process, i.e., during continuous fermentation. Different systems for both volatile and non-volatile components were compared, taking into account their cost effectiveness and practical applications.

The session closed with a much appreciated talk by W. De Logi, director of the Radar NV company, on the nature of biotechnology and its economic aspects, under the significant title: "Biotechnology: A Technology in Search of a Customer." He emphasized that, although biotechnological research is well structured and rather extensive, practical applications as such are still lagging because of insufficient marketing efforts. He illustrated attempts to find a solution with a few practical examples.

The visual presentation sessions followed these morning talks and gave participants ample time for discussion. After lunch, the program continued with seven concurrent sessions.

In the session entitled "Bioreactor Design and Downstream Processing," chaired by Prof K. Luyben, 5 oral reports and 10 visual presentations were given. Several subaspects were treated.

The feasibility of process control during the fermentation process was discussed by Eng J. Spriet (RUG), while J. Simon (CERIA) [Center for Training and Research of the Food and Chemical Industries] spoke on the influence of diffusion on the physiology of immobilized cells. J. Bouflette (ISO) explained fluorescence measurement for determining the biomass of lactic acid bacteria.

The prospects for an enzymatic membrane reactor for lactose hydrolysis during enzymatic processes were covered, as well as the optimization of soluble and immobilized lactase activity.

The production of SCP's [single-cell proteins] and pigments through phototropic bacteria and of ergot alkaloids through Claviceps purpurea were explained in two visual presentations.

In discussing upgrading methods, B. Lindman (Alfa Laval) explained the effect of centrifugal separators. The prospects for preparative radial chromatography and a method for capacity determination of ion exchangers were introduced in visual presentations. In a presentation on membrane technology, R. Leysen (SCK [Center for Nuclear Energy Studies]) focused on the production of composite membranes, while L. De Valck (RUG) discussed membrane permeability caused by pollution.

Finally, three applications of upgrading techniques were discussed: the isolation of immunoglobulins in milk, of tripeptides in baking yeast, and of bacteriocine produced by Lactobacilus acidophilus.

In the second session on "Plant Cell Biotechnology," chaired by Prof R. Jacobs (VUB [Free University Brussels]), B. Pieters (RUG) indicated the highly divergent behavior of sugar metabolisms in chrysanthemums and in artichokes.

P. Rudelsheim (UIA [Antwerp University Institute]) explained that research in several types of crown-gall tissue induced by several strains of Agrobacterium tumefaciens had shown that the introduced T-DNA fragments were involved in both the auxin and cytokinin metabolisms.

Using a digital image analysis system, Dr P. Van Oostveldt (RUG) studied the differences in chromatin contraction and DNA evolution between embryogenic and nonembryogenic calluses of Phyllostachus virides.

Soil cooling is an innovative technique for quality amelioration of plants multiplied by micropropagation. Mrs A. Vanderschaeghe (CSVT [not further identified]) gave a cost analysis of the different systems.

Using fuchsia and rice as sample plants, Lhoest (Carnoy Institute) studied the feasibility of selecting salt- and temperature-tolerant (resistant) strains at the cell and/or callus culture levels.

Finally, M. Geerts (RUG) indicated that apexnecrosis in Prunus avium can be prevented by simply increasing the calcium concentration in the medium.

This session concluded with nine visual presentations.

The first paper of the session on "Nutritional Biotechnology," chaired by Prof P. Thonart (Gembloux), focused on xylose metabolism in Pachysolen tannophilus in view of the production of xylitol. The possibility of using an "immobilized cell reactor" was also studied.

In a second presentation, Mrs G. Vlaeminck (State Dairy Station, Melle) discussed lysozyme addition and bactofugation in the preparation of hard cheese to prevent the formation of butyric acid and gas. Apparently neither the addition of 25 ppm lysozyme nor bactofugation inhibit butyric acid fermentation completely.

Two other papers dealt with meat. First, Eng B. Buts (RUG) discussed the problem of meat tenderness and explained its "post-mortem" determining factors. Hope was expressed that optimal tenderness would be obtained through a short manipulation, before or after slaughter, of the enzyme systems which play a part in meat tenderness.

The next paper on meat, presented by Eng S. Van Hoye (RUG), gave a general overview of dry sausage fermentation. It was stressed that oxygen consumption and sausage diameter are major determining factors in the fermentation process.

The last visual presentation was made by J. Damme (CTL [School of Chemistry, Technologies, and Agriculture]), who introduced the use of lactic acid bacteria to extend the freshness of fish. Lactic acid bacteria seem to change the microbial ecology of fish to such an extent that decay-causing bacteria are restrained, thus retarding perishability.

The session "Forage Biotechnology," chaired by Prof M. Van Belle (Louvain-La-Neuve), included six oral and five visual presentations. Authors from Canada, France, the Netherlands, and Belgium presented work on topics varying from industrial lignocellulose treatment to the effect of anabolics on meat production in pigs and cattle. The optimization of microbial digestion systems by means of microbial proteins, genetically manipulated microorganisms, enzymes, and pro- and antibiotics were also discussed.

The central theme of these oral reports was the use of lignocellulose, either directly in ruminant food or in industrial fermentation processes. A stimulating discussion indicated that the two applications are based on totally different processes, and researchers in both fields expressed the need for additional information sharing. Restrictive factors in digestion optimization seemed related to the complexity of animal digestion systems. Direct forage treatment was said to offer better prospects.

The session on "Environmental Biotechnology" was chaired by Prof H. Verachtert (KUL [Catholic University of Leuven]). Two subjects were related to soil biotechnology. Eng M. Hoefte (RUG) explained the controversial problems regarding the release of genetically engineered microorganisms in the environment. Dr L. Diels (SCK) threw some light on microbial physiology in relation to heavy metals. Three lectures dealt with waste-water purification. Eng L. Vriens (Stella Artois) introduced several specific advantages of the Unitank

system. Eng D. Schowanek (RUG) showed the operating capabilities of Rodtox equipment and Eng M. Eeckhaut (Biotim) surveyed the possibilities for fermenting saccharine waste waters. Dr H. Van Langenhove (RUG) illustrated the workability of compost filters.

Ten visual presentations were reviewed in the morning. Three contributions dealt with lignocellulose conversion, either by white rust fungus conversion (KIHO), by anaerobic fermentation (RUG), or by enzymatic treatment (Boerenbond [Farmers Federation]/Artois). Five papers discussed water purification, namely domestic waste water (De Wit), oil-bearing sludge (Sanexen), detergents (CTL), mixed fertilizers (Sanexen), and industrial waste water (KUL). There was also a contribution on drinking-water preparation and, finally, a visual presentation on heavy metals in plants (LUC [University Center Limburg]).

In his conclusion, the chairman pointed out the different levels at which environmental biotechnologists must work, from plasmids to reactors with a capacity of several thousand cubic meters.

In the session "New Genetics," chaired by Dr Eng G. Boeken (PGS [Plant Genetic Systems]), four speakers from industry as well as the academic world discussed fundamental genetic subjects and related them to potential or existing applications. In this respect, the protoplast fusion technique could soon contribute to the creation of useful industrial fermentation hybrids, but its molecular genetic characterization is essential to confirm alleged as well as successful fusions. DNA restriction, fragment analyses, and chromosome separation using new electrophoresis techniques are paramount, Dr Eng L. Machtelinckx (RUG) concluded.

Dr M. De Block (PGS) illustrated the introduction of herbicide resistance in plants through the expression of a microbial detoxication enzyme by means of the phosphinotricine-acyl transferase of Streptomyces hygroscopicus, which also produces the nonselective herbicide bialaphos.

The development of phage-cloning vectors for industrially useful microorganisms, the Streptomycetes (well-known antibiotics, pharmaceuticals, and enzyme producers), seems useful for a better understanding of gene-expression and protein-secretion regulation in these bacteria, according to Dr Eng J. Anne (KUL).

The use of plant-cell mutants resistant to lysine analogues can produce plants with an increased essential amino acid content and a higher nutritive value. Cloning procedures for a lysine-overproducing gene in Nicotiana sylvestris are being developed by Dr M. Ghislain (VUB).

A visual presentation by Dr G. Volckaert (KUL) covered the domain of nonchemical DNA synthesis, where base pair assembly relies on the repeated cloning of a modular DNA fragment within specific vectors.

The session "Biocatalysts, Fine Chemicals, Pharmaceuticals, and Diagnostics" was introduced by the chairman, Prof Dr Eng J. De Bont (Wageningen, the Netherlands). Highly application-oriented subjects were covered by four lecturers from the academic world.

According to Eng A. Vermeire (RUG), powerful hydrolytic conditions in oils and fats can be avoided by using microbial lipases. In this respect, lipase fermentation and isolation development is necessary. A reduction in production costs and an increase in enzyme stability can then be pursued by immobilizing the enzyme.

Microbial oxydation of heteroaromatics by xanthine oxidases was covered by Dr Eng J. De Meester (Wageningen). A comparative study of lactic and Arthrobacter xanthine oxidase showed that activity as well as specificity justify microbial enzyme use. Practical research aspects were covered in a visual presentation.

G. Mannens (RUG) explained more fundamentally oriented enzymatic synthesis research into the (^{11}C)-labeled acetyl coenzyme A. The synthesis of this cofactor leads to new research fields in the biomedical world, more specifically positron emission tomography.

Myeloperoxidase immobilization offers several prospects in relation to the halogenation of monoclonal antibodies with bromine positron emitters (B. Pluym, RUG). The halogenating products are then used for diagnostic means in nuclear medicine.

Six visual presentations were made along with these four lectures. Eng L. De Vuyst (RUG) demonstrated an optimized xanthan fermentation process.

Eng J. Hallaert (RUG) proved that L-lysine fermentation can be manipulated by using homoserine auxotrophic and AEC-resistant Corynebacterium strains.

According to M. Heyndrickx (RUG), microbiological H_2 production produces higher process yields when activated by saccharine alcohol instead of glucose.

Eng J. Janssens (RUG) discussed flavor development, where new ester synthesis is being stimulated by adding precursors.

In immunology, J. Kint (RUG) suggested the use of egg-yolk antibodies for the nephelometric determination of "human serum transferrin." According to the author, the transformation of the egg yolk, rich in lipids, to a clear watery extract is of crucial importance.

Although this session dealt primarily with applied research, the absence of industrial researchers was somewhat suprising.

After the scientific portion, participants met at a reception given by the sponsors of the forum: Amando NV, Amylum NV, Bruggeman NV, Inza NV, Maes NV, and Comelco NV.

The smooth cooperation between the RUG's Department of Agriculture and the West Flanders Regional Development Society [GOM] contributed to the success of the forum.

The Department of Agriculture was responsible for the scientific content as well as the practical organization, whereas the West Flanders GOM handled the administration. As a result of recent initiatives in biotechnology (among others the publication of the BIOTECHNOLOGICAL REPERTORIUM FOR FLANDERS and the circulation of the BIOTECHNOLOGY TRANSFER periodical), the GOM has established useful contacts with Flemish industries.

The success of this first forum has already convinced both parties to continue the initiative. The second Forum of Applied Biotechnology will be held on Thursday, 29 September 1988.

25068

French Biotech Aid Itemized

3698A222 Paris BIOFUTUR in French Mar 88 p 7

[Text] The Research and Technology Fund [FRT], the financial unit of the Ministry of Research (MRES), will receive Fr930 million in 1988. In particular, this will provide a fresh impetus to new national program topics. The biotechnology program (microbiological engineering, enzyme engineering, and biotech R&D) will receive Fr21 million from FRT. (The program has been allocated approximately Fr60 million.) Other national programs have a biotechnological bias: food products (Fr180 million, of which Fr40 million coming from FRT), medical research (Fr90 million, of which 50 million from FRT), natural resources (Fr21 million, of which Fr9 million from FRT), and advanced chemistry (Fr30 million, of which Fr13 million from FRT). In broad terms, biotechnology in general will receive about Fr380 million in aid, Fr123 million of which will come from FRT. In addition, FRT will provide Fr200 million to EUREKA, Fr160 million to training, and Fr120 million to regional projects.

25041

COMPUTERS

FRG: Commodore CAMD for Braunschweig Biotechnology Research

3698M348 Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 477, 13 Apr 88 p 14

[Text] Computer Assisted Molecular Design (CAMD) is a technique aimed at reducing the costs involved in the development of pharmaceutical products. The trial and error procedure, whereby the pharmacological efficacy of endless products is tested in the hope of an accidental hit, is being increasingly replaced by the targeted and hence less costly computer assisted development of active ingredients. The CAMD computer is more or less the equivalent of CAD for technical engineering. Nevertheless CAMD has still two major disadvantages: first of all, the full potential has not yet been achieved for high molecular weight protein design, as opposed to low molecular weight active ingredients. Furthermore, the required equipment is very expensive, so that small and medium-sized enterprises as well as publically supported research institutes can hardly afford it. More wide-ranging applications have thus been hindered and this in turn has prevented the acquisition of broader experience, which is the precondition for the attainment of full potential.

The Braunschweig-based Society for Biotechnological Research (GBF) is going to tackle this problem. It has agreed with computer manufacturer Commodore on the development of a cost-effective high performance workstation for molecular graphics. The station will be used by scientists in the medical and biotechnological sectors for drug and protein design, which requires particularly high performance graphics processors and high arithmetic speed. A flexible, open-end, modular system for the industrial and research sectors has been planned. Thanks to lower costs, even small-sized enterprises and institutes will be able to exploit this technology.

The GBF will contribute to this partnership with the experience it has acquired in the area of protein design. Furthermore, several software packages developed by the GBF will be implemented on the planned workstation, including the protein modelling software "BRAGI" (Braunschweig-GBF Interactive Protein Modeling).

However the cooperation between the GBF and Commodore is not confined to this: the joint development of hardware and software for biological data banks is also planned. Moreover Commodore will contribute to GBF's planned "Center for Applied Protein Design."

8802/08309

Knowledge Engineering R&D for Expert Systems at FRG Institute

36980337b Landsberg PRODUKTION in German 19 May 88 p 5

[Unattributed article: "Methods and Theories: Knowledge Acquisition for Expert Systems"]

[Text] An efficient and wide-spread use of expert systems has been seriously hampered by a lack of methodology and theories of knowledge acquisition. GMD is working on a new project to address this problem. The Kriton system represents the initial results of these efforts.

The critical questions for which Kriton is expected to provide an answer are:

- How is knowledge obtained for an expert system?
- How can the subjective interpretation of knowledge by the "knowledge engineer" be avoided?
- What methods can be used to support the life cycle of expert systems?
- How can an overview be maintained in the case of very large expert systems?

Expert systems, particularly those of the second generation, include, in addition to the representation of a problem area, a model of the problem-solving process of the expert. This model must not be limited to a superficial juxtaposition of input and output, but must answer questions according to the motivation of individual problem-solving steps.

For this reason, the process of knowledge engineering is concentrated on modeling the problem-solving procedure of the expert. Manuals and background literature are analyzed, discussions are held with the expert in question, and the expert is observed at work. The knowledge acquisition system Kriton supports the development of expert systems by automating a portion of these tasks. This means not only an increase in efficieny and methodology, it also prevents the knowledge engineer from wrongly interpreting data, since the expert interacts directly with the system and the knowledge engineer appears only as a moderator between the expert and the acquisition system.

Kriton combines three acquisition techniques in a blackboard architecture:

- Interview techniques inspired by cognition psychology, i.e. repertory-grid method and laddering, with which the static knowledge of the expert is made accessible to the expert system;

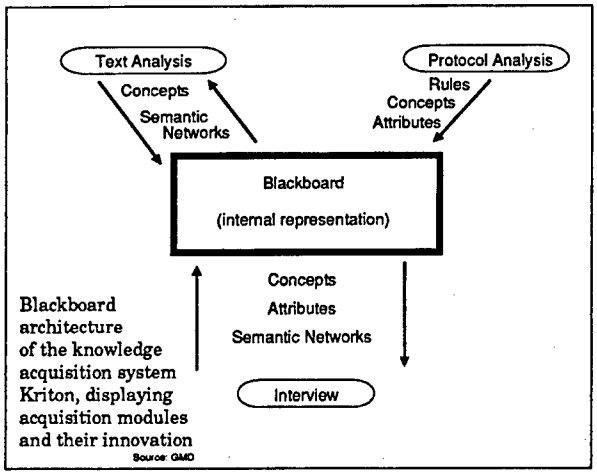


Diagram of Kriton System

- Text analysis techniques which include background literature in the knowledge acquisition process, and
- Protocoll analysis techniques which attempt to extract the rules from protocolls "of thinking aloud."

The techniques integrated into the Kriton system cannot replace the human being in the development of expert systems; their task can only be that of an aid in the knowledge engineering process.

Kriton runs on a Symbolics 3620 Lisp machine. The system requires about 500K of RAM. Portions of the system are now being implemented on the Macintosh as well. An initial implementation is being planned for the VLSI area.

12792

Computer Applications Expected for Lithium Battery R&D in France

36980337a Leinfelden-Echterdingen EEE in German 24 May 88 p 7

[Unattributed article: "First Lithium Symposium"]

[Excerpts] Lithium batteries with solid cathodes and organic electrolytes—a cell technology developed over a decade ago—are available today as a solution for the many tasks involved in the area of data security. Hardly a printed circuit board with RAM chips containing permanent data can manage without the lithium battery.

The firm Saft Akkumulatoren und Batterien GmbH recently sponsored its first lithium symposium in Europe. The company wanted to provide an opportunity for its customers and other interested parties to keep abreast of new technology and future developments.

Lithium batteries possess a number of characteristics which distinguish them from other batteries. In terms of data security, the very small self-discharge rate of ca 1 percent a year is particularly meaningful, while in high-temperature applications the broad working temperature range of -30 to +150 degrees Celsius can be put to excellent advantage. The company expects an additional increase in demand if it succeeds in applying the qualities of lithium to rechargeable battery systems.

The results of experiments with rechargeable lithium batteries containing organic electrolytes have led Saft to select vanadium pentoxide from the available oxides as a material for cathodes. The goal of the ongoing research program is to develop a rechargeable lithium battery for communication technologies. Such a battery would have the following performance characteristics:

- Energy density: 100 Wh/kg (3 times that of NiCd)
- Energy density: 200 Wh/l (2 times that of NiCd)
- Number of cycles (for 100% discharge): 100
- Operational temperature range: -40 to +70 degrees Celsius.

Saft expects to be able to manufacture and deliver these secondary batteries on a large scale in about two to three years. At that point, these rechargeable systems could gain wider acceptance as compared with NiCd batteries because of their higher energy density, the low self-discharge rate mentioned above, and the favorable range of working temperatures, even below the zero degree threshold.

Saft GmbH in Mainaschaff is the German distribution arm of the French Saft company. In order to be able to meet the special needs of regional customers, the GmbH several days ago began production in its plant. In Mainaschaff batteries with widely varying capacities and shapes are assembled out of individual prefabricated cells. Saft engineers have developed accumulator systems for radio telephones and cordless electrical tools which are manufactured in the FRG according to customer specifications. More attention will be paid in production to quality control of the Saft products manufactured abroad.

12792

Dornier of FRG Develops Expert System for Wafer-Coating

36980337c Landsberg PRODUKTION in German 19 May 88 p 7

[Unattributed article: "New Invention: EXS Optimizes Process of Wafer-Coating"]

[Text] Friedrichshafen. There is a world premiere taking place on the AI market: Dornier has developed an expert system which ensures an even quality in wafer-coating and considerably lowers production costs.

"We proceded from the assumption that a skilful process stablization could save 50 - 75 percent of production costs and, because of timely corrections, production outages could be largely or even entirely avoided. This resulted in cooperation with the Swiss manufacturer of epitaxy reactors, Sitesa SA, to the development of an expert system which supports the user in assembling a process control program," explained Wolfgang Samlowski, program director for expert systems at Dornier Systems. 'Epitexpert,' as the systems is called, generates the required program from production specifications, with up to 70 parameters.

"It is not simply a case of selecting something from a library of programs, instead, the program is newly generated and compiled," Samlowski points out.

The knowledge base of the system helps the user of Sitesa Ovens not only in the generation of programs, but also by means of suggestions for the right production start-up strategy and wafer-testing strategy, as well as in the elimination of production problems.

The project has also broken new ground with regard to AI. For example, it utilizes a design strategy that ensures a user-friendly CRT screen.

All procedures are initiated with a mouse.

12792

New French Center To Focus on Parallel Architecture R&D

36980353c Paris INDUSTRIES ET TECHNIQUES in French 20 Jun 88 p 25

["Parallel Computing: A European Center"]

[Text] It had been discussed since 1983. In a few months, an association was created to study the feasibility of the project and its major tasks.

In May 1988, the European Center for Advanced Training in Scientific Computing, CERFACS, officially inaugurated its computer equipment. It has the scientific support of the most famous researchers in the field, the patronage and financial aid of large companies and universities directly interested in its work (CNES, National Meteorology, INSA, and so on), and the material backing of computer manufacturers.

Its objectives are now well defined: test parallel computers and develop algorithms for these supercomputers. In addition to the existing code, CERFACS is developing codes known as "parallel" for specific applications. The topics presently being studied are parallel algorithms (Ian Duff), instabilities and turbulence (Maurice Meneguzzi), and real flows (Hieu HA Monh and Arthur Rizzi).

The manufacturers, as good fairies hovering over the newborn's crib, have offered about Fr30 million of equipment. Control Data has installed an ETA 10P supercomputer, Matra Datasysteme an X-MS 7020 four-processor, and IBM a 9370. By autumn, CERFACS will also have an Alliant FX/80 with eight processors, a Gould NP1, and a VAX 8000 graphics superstation from DEC.

11023

France Shows Latest Artificial Intelligence R&D at June Show

36980353a Paris INDUSTRIES ET TECHNIQUES in French 20 Jun 88 p 36

[Article by Franck Barnu: "Artificial Intelligence Steps Down From Its Pedestal"]

[Excerpts] Avignon 88. We have stopped counting the expert systems installed in industry, even if they still are most often test models or prototypes. Operational applications are even rarer, but not for much longer.

Along the aisles of the Avignon 88 show, we did not hear as much talk of "0+ order inference engines" as of applications. Another proof that artificial intelligence, now almost identified with SE expert systems, has matured. The (major) users are convinced. The "gurus" are giving way to the manufacturers; IBM, Bull, Digital, Control Data, Unisys, to name only the biggest, were all there. The research aspect was left to the lectures, a large share of which were also devoted to applications.

Looking again at France, we were surprised to discover in Avignon a veritable avalanche of SE applications in industry.

Several Months of Often Essential Tests

The Marcoussis laboratories showed four: Ampere, to eliminate overloads on the EDF network; Diva, to diagnose turboalternator defects; Manta, to maintain them; and Ferex, to assist in concrete reinforcement. Syseca demonstrated an SE to assist in blast-furnace management for Solmer; its interesting feature is that it diagnoses furnace thermal losses based on data collected from 800 process sensors. Frame presented a passel of them, developed with Personal Consultant of Texas, among which: Polapres, to aid in correcting milling defects; or Dacar, to aid in diagnosing breakdowns in the production of medicine bottles (for MSD-Chibret). ISE-Cegos showed an SE to help manage a furnace in a steel mill (Creusot-Marrel), and another for process control help (BSN Emballage), whose development is based on Guru on a microcomputer. At which point we cut off our list.

While we can be impressed by the industry's infatuation with expert systems, the truth is that of the dozens of systems that were shown, very few can be qualified as operational finished products in everyday use, rather than models or prototypes. One measure of this fine point is that for Logic, a very interesting SE aid for computer code utilization developed by Framentec for Aerospatiale, the phase I prototyping required 18 man/months, and the implementation phase 28 man-/months at Framentec and equally as long at Aerospatiale, placing the total cost of the system at "several million francs." It also reminds us that there is a world of difference between an SE "which works" and an SE that runs in its everyday environment, particularly when it involves a shop. Several months of testing are often essential, and it easy to understand why the acknowledged cost of the few systems that can be considered operational is never less than one million francs.

Such is the case for Tracor, an SE on a Vax Station 2000 developed by Cognitech with its Sagane tool, and used for the past six months at Kaysesberg to control an Akylux line. This SE illustrates one of the technology's great motivations, namely, broader expertise in the company: it was a matter of making available to all operators the resources of the only expert capable of exercising optimum control of this very complex line.

And lastly, there were two new products typically intended for industry. Apex, from Apside Technologies, is an expert system generator specially designed to build diagnosis and maintenance applications, a field which is eliciting a lively interest (witness the success of Framentec's Maintex). Euristic presented a real time (meaning response times of the order of one second) expert system adapted particularly to process control applications; this is a product developed in Ada, with priority rules, integrating time management, and developed with help from Sagem, which will use it to control flexible cell machining. It costs Fr60,000 for the PC and Fr120,000 for a work station.

11023

French-Designed RISC Microprocessor To Be Produced by NEC

36980353b Paris ELECTRONIQUE ACTUALITES in French 24 Jun 88 pp 1, 18

[Article by P. M.: "First French RISC Microprocessor Dedicated to AI"]

[Text] Samples of the first 32-bit, RISC-architecture microprocessor developed by a French company, are expected this September. This 17,000-gate standard cell which will be produced by NEC, was developed by Sodima, a company created in 1983, employing 20 people, and located at Cachan, near Paris. Compared to a general purpose microprocessor, KIM can speed up symbolic processing by a factor of 20 under the best circumstances.

Sodima's KIM microprocessor, a true 32-bit RISC (reduced instruction-set computer) capable of 10 MIPS at 10 MHz, thus joins the only two circuits that have been announced so far as optimized for processing artificial intelligence languages: the Lisp microprocessor developed by Texas Instruments and integrated into its MicroExplorer workstations, and the Ivory circuit from Symbolics.

KIM is built with 1.5 μm technology by NEC and will thus be able to take advantage of a reduction to 1.2 μm in the future. Currently however, the 1.5 μm chips are timed at 10 MHz and selected units can be "pushed" to 20 MHz. KIM will be aimed at two distinct areas. First of all, and the purpose for which it was designed, it will be used for an Europe triple card for a Sun workstation. Specialized in AI and image processing, Sodima is also an OEM for Sun equipment.

At the same time, KIM will be marketed both as a component, at a price in the range of Fr2000 to Fr8000. The model operating at 10 MHz will be sold for about Fr4000, and the one at 20 MHz will come close to Fr8000. While the sampling is scheduled for next September, volume production should take place toward the end of the year.

A card called KIM1PO10 has already been made by Sodima.

In the Europe triple format for Sun workstations, it integrates the KIM microprocessor, 256 Kb of RAM program with 35 ns access time, equally as much stack RAM, and from 256 Kb to 4 Mb of data memory organized into 64-bit words.

KIM's architecture has a set of 32 labeled instructions (eight label bits followed by 24 bits), 8192 windows on 16 32-bit registers, and 16 interrupt levels.

The operating system, called KOS (knowledge-based operating system) is available as an option.

11023

CNRS Lab Develops Microprocessor for Multilingual Voice Recognition

3698A288 Paris FRENCH TECHNOLOGY SURVEY in English Jun 88 p 7

[Text] The micro PCD, a dynamic comparison microprocessor developed for voice recognition with a broad vocabulary, has been developed by LIMSI [Laboratory for Computer Science Applied to Mechanical and Scientific Engineering] at the CNRS [French Scientific Research Center] as part of a voice-input typewriter. This research has been carried out in conjunction with Bull and Vecsys. The microprocessor has been operational since 1987 and will contribute to the production of voice recognition systems being developed by these companies, along with other applications: Crouzet is examining its use in the area of pilot-plane dialogue.

The micro PCD, unlike non-specialised microprocessors capable of recognizing only a hundred or so isolated words, is designed so that each circuit identifies 1,000 to 5,000 words pronounced separately (with a pause of two-tenths of a second) and from 300 to 600 words in continuous speech. This microprocessor uses 2-micrometer CMOS technology; it includes 130,000 transistors on a surface area of 60 mm^2 and delivers 10 MIPS (million instructions per second). The LIMSI is working with this microprocessor in the area of syllable recognition as part of a voice-input typewriter which should produce a prototype by 1990.

In addition to this project, the laboratory is also working for the linguistic part with several European partners as part of the European ESPRIT program with Olivetti (Italy) as prime contractor. This is a project for a voice-input multilingual typewriter. The aim is for seven languages: French, English, Italian, German, Dutch, Spanish, Greek, and possibly Portuguese. The LIMSI is also examining the possibility of cooperating on a voice synthesis project: a text that can be read aloud in seven languages.

DEFENSE INDUSTRIES

France, Britain, FRG To Develop Antitank Missiles

3698A283 Paris BULLETIN DU GIFAS in English 30 Jun 88 pp 2-3

[Unattributed article: "Aerospatiale Anti-Tank Missile for the Year 2000"]

[Excerpts] Conventional forces constitute a constantly increasing menace for Europe: multiplication of armoured vehicles, important breakthroughs in armouring which make use of ceramic composites, increasingly significant role of armoured combat helicopters, etc.... To meet this danger, Aerospatiale (France), British Aerospace (Britain) and MBB (Federal Germany) decided in 1979 to establish a 3-way partnership, and at the instigation of their governments, founded the GIE [economic interest group] Euromissile Dynamic Group (EMDG Consortium).

At the end of May 1988, the French, British and German Governments signed the inter-governmental agreements authorizing complete development of European long- and medium-range anti-tank systems of the so-called 3rd generation.

The signing by the three partners culminates long and detailed studies and negotiations to determine the relative technical clauses and industrial and financial arrangements to be handled by EMDG as part of the agreement. Official notification is now imminent.

According to plan, these anti-tank systems will be ready for service by the mid 1990s. Their performance will be adapted to anticipated battlefield conditions of the year 2000 and beyond, particularly to meet enhanced hardening of armouring, countermeasures and combat in urban zones.

The long distance system will be of the fire-and-forget-type and will be carried by land vehicles (tank hunters) and by present and future helicopters. Both French and German military headquarters have decided to equip the future combat helicopter HAC/PAH2 with the system.

In 1986, preliminary studies resulted in the selection of two systems: the AC 3G MP (3rd generation medium-range anti-tank) and the AC 3G LP (long-range).

The "AC 3G MP" Medium-Range Missile

This missile is based on the same principles as the new Eryx infantry anti-tank missile developed by Aerospatiale: direct thrust control and low ejection which authorizes firing at low initial velocity from enclosures without hindering the gunner. Flight time is 11 seconds for a range of 2000 m (twice the speed of the Milan). The

double warload is effective against all modern armour. The complete munitions package weighs approximately 17 kgs, and the firing unit 16 kgs.

Its laser beam guidance makes for great accuracy and is transmitted in the 10-micron range from the firing. The missile automatically locks on the center of the beam. The missile is highly accurate and has high resistance to countermeasures (laser receiver placed at rear of missile) and jamming (smoke and fog). A thermal-imaging night sight is fitted to the firing unit giving the system all-weather day/night capability.

Long Range System "AC 3G LP"

This fire-and-forget-type missile can be fired from a helicopter (type HAC/PAH 2) or vehicle. The power plant is a monoblock dual-mode powder-burning rocket. It is piloted by aerodynamic flight surfaces, carries a tandem load and has a terminal phase dive attack. Maximum warload weight: 43 kgs; range: minimum 4500 m. The high-performance tracking device operates on thermal infrared (10-micron band) and within the visible spectrum (TV camera). The operator designates target (as many as 4 different targets), and the homing phase is automatic with possibility of salvo firing, which guarantees minimum exposure time for the firing vehicle. During flight, each image is compared with the preceding one by the homing device.

Mounted on a helicopter, the system will complete four rounds ready to fire and has a mast-mounted sight (or day/night firing configuration installed in the nose).

On armoured vehicles, an extendable 12-meter long mast is fitted with a sighting unit on end for observation and firing from well-protected postitions. A low profile compact turret is also being designed. The system will comprise a dual automatic reloading ramp under armour with NBC [nuclear, bacteriological, and chemical agents] protection.

Agreement Signed in Bonn for European Fighter Aircraft

3698m418 Milan ITALIA OGGI in Italian
18 May 88 p 10

[Article by Massimo Ferrari: "A Super-Fighter for the Skies of Europe"]

[Text] Milan—The agreement made between Italian Defense Minister Valerio Zanone and his British and FRB counterparts for development of the EFA (European Fighter Aircraft) is a historic one. With this leading edge technology program, the aerospace industries of the "Old World" take a decisive step toward freeing itself from U.S. leadership and becoming recognized competitors in every respect for the output of the superpowers.

The agreement also includes Spain, whose defense minister was unable to attend the signing ceremony because the Spanish parliament has not yet completed the procedures authorizing the initiative. However, Madrid has already expressed full approval of the initiative, and experience has shown on many similar occasions in the past that this will lead to active participation. It is also significant that the minister who signed the agreement on behalf of the FRG was Manfred Woerner, who is to leave the FRG government next Thursday to take up his position of general secretary of NATO from 1 July. It is worth remembering that Woerner has always defended the EFA program, even in the face of the numerous doubts expressed by other members of the FRG parliament.

At a strategic level, the green light for the EFA program is of the utmost importance, because it makes it possible to have a clearer idea of the future airborne defense strategy chosen by the European nations belonging to NATO. This choice does not include the countries in the northern sector of the alliance (Belgium, the Netherlands, Denmark, and Norway), which in 1975 chose to upgrade their fighters with the General Dynamics F-16. Nonetheless, everything leads one to believe that in due course they too may opt for the EFA, whose operational capabilities are oriented well into the early years of the next century, at a time when these countries will have to replace their top of the line fighter planes. Therefore, the premises exist for the new European fighter to pursue a highly successful career and acquire vast markets. Not to mention the fact that, if the EFA were to be chosen by the air forces of NATO countries other than those manufacturing it, this would produce a de facto situation in which the materials used would be standardized on a level not seen since the 1960's—with the difference that then all the materials used were either purchased or manufactured under license from the Americans, while the aircraft to be constructed today would be European. Clearly, it will be necessary to overcome the competition from both the French (which is extremely fierce) and the Americans. Nonetheless, the prospects still look good.

But let us examine in more depth the forecasts for the EFA project. With the help of the experience already acquired by the three nations involved (a major contribution was made by Aeritalia in this connection) and the testing carried out by the British on the EAP demonstrator (again achieved with the support of Aeritalia, which was of fundamental importance), it is estimated that the first prototype will fly in 1991. Testing should be completed fairly rapidly, because the aircraft produced in series are scheduled to enter into service sometime between 1993 and 1997. We believe that the latter date is the more realistic of the two; the experience of the Tornado, in fact, has taught us that a period of 10 years is generally required to develop a fighter plane. While this may seem a long time, in reality it is not, and the result is certainly worth the price.

However, it is expected that the EFA will have an operational validity of at least 15 years, thus ensuring its

use well into the 21st century. Today the total cost, including the cost of development, is estimated at the equivalent of about 80 billion lire for each of the 750 models to be constructed. Italy should receive almost 20 percent of this total number, that is, 165 aircraft.

Italy's contribution to the research and development costs will be equal to that of the other countries, and this constitutes a substantial commitment for Italian industry. However, the benefits to be acquired in terms of technology are enormous: the damage that would have been done if this opportunity had been lost are inestimable.

However, a new problem now presents itself, and this is one that will have to be solved rapidly by the competent bodies. The F104S and ASA fighters of the combat forces are unable to guarantee adequate coverage up to 1997, despite the fact that their electronic components have been upgraded. Now that the guidelines of the project have been defined, it would be advisable for the defense minister to make a decision in this connection in order to ensure that the standard of quality of our airborne intercept forces is maintained.

[Box insert, p 10]

Twenty Years of High Tech Work

Rome—The future is now certain. With the new European fighter, the EFA, Aeritalia firmly believes that it will be able to work at full capacity, particularly in terms of research.

Fausto Cereti, vice-president and managing director of Aeritalia, told ITALIA OGGI that: "Development of the project ensures work and technological progress for our industries for another 20 years."

The company, which forms part of the IRI [Institute for the Reconstruction of Industry] Group (with Finmeccanic holding the controlling interest) is the Italian project leader for the development and production of the airframe, or in other words the entire aircraft minus the engines. Responsibility for the engines also goes to an Italian company, Fiat Aviazione. The share of work assigned to Italian companies totals 21 percent, while Britain and the FRG have 33 percent each, and Spain 13 percent. This split was announced officially on Monday in Bonn, with the signing of the memorandum of understanding for the EFA by the Italian, British, and FRG defense ministers.

"The technological innovations planned," states Cereti, "are of great importance. On the one hand, let us just take the carbon fiber structures for the new aircraft produced using industrial processes researched and developed in the Aeritalia factories in Turin, and on the other hand, the use of expert systems, a field in which Aeritalia has been involved for some time."

Of the 21 percent allocated to Italian firms, the company of the IRI Group will have the lion's share, constructing the left wing and half the rear fuselage. A number of small and medium-sized companies will be involved in a deal that is estimated as being worth a total of almost 13 trillion lire over the next 10 years, which in turn means that the Italian share is worth approximately 2.5 trillion lire.

The first prototype of the EFA, the new fighter which will replace the F104S, will be ready in the spring of 1991. The following year it will fly for the first time with the final motor. Production will start in the spring of 1993, the objective being to start deliveries in 1996 and complete them in 2005. The 765 EFA fighters scheduled for production will be manufactured by the Eurofighter consortium.

"The launching of the project," states Cereti, "represents a decisive step forward for European defense, consolidating the relationship of collaboration between European industries that started with the Tornado and has now existed for 20 years. In this connection, the participation of Spain, a country which recently became an active member of the EC, is significant." The EFA fighter will be a single-seater aircraft capable of reaching higher altitudes than the F104S, and will have a modest weight of 9.5 t. A major contributory factor to the reduced weight is the use of carbon fiber, a technology in which Aeritalia has played an active role. Aluminum alloys will also be used. The wing surface will be 50 m^2.

08616

Matra of France Reorganizes Military Space, Communications Work

36980354a Paris ELECTRONIQUE ACTUALITES in French 17 Jun 88 p 9

[Article: "Matra Creates an 'Image and Command-Data Processing System' Entity"]

[Text] Matra [Mechanics, Aviation and Traction Company] has decided to reorganize its activities in the fields of space image processing (Helios program) for military purposes (mission preparation) and military communications (LCT [Central Laboratory for Telecommunications]). Essentially, this reorganization aims to meet the increasing data-processing needs of modern armies which must process—in the shortest possible time—all the data provided by their communication networks so as to optimize their use of the sophisticated and automated systems available to them. This is why Matra decided to regroup its current activities, now distributed among its Defense and Space branches and its LCT subsidiary, and to create a new entity: "Image and Command- Data Processing Systems (T21)."

This operation will become an integral part of the Defense/Space pole headed by Noel Forgeard; it will be headed by Michel Schmit, the LCT director. The new

division will retain very close links with the Telecommunications branch so that (following the current trend) spin- offs of civil technologies and equipment could be used to to meet military requirements.

9294

FACTORY AUTOMATION, ROBOTICS

Non-Destructive Testing of Pipelines Through X-Ray Imaging

3698A289 Paris FRENCH TECHNOLOGY SURVEY in English Jun 88 p 5

[Text] The Institut de Soudure has presented special automatic intra-tube coolers capable of inspecting weld seams in pipelines. The current method for non-destructive testing of circumferential welds of sub-marine pipelines is the traditional radiographic inspection. In order to overcome the drawbacks of this method, the Institut de Soudure has developed an X-ray real-time imaging system including an X-ray apparatus rated at 320 kV, an X-ray image intensifier, plus a television camera and an electronic image processing system; the whole unit is controlled and supervised by a real-time data processing system. With the double-wall inspection technique, a sensitivity of 1.6 percent on a single thickness may be obtained on a 24-inch diameter, 20-mm thick pipeline. A 100 percent inspection of such welds is possible with this system in just 4 minutes.

The company also provides a system for the inspection of seamless drawn tubes or roll-welded tubes of various diameters, thicknesses and lengths. It includes focused probes working in local immersion and coupled to a graphic recorder. According to the Institut de Soudure, this automated unit increases the inspection rate while ensuring optimum detection capabilities.

LASERS, SENSORS, OPTICS

Fraunhofer Institutes Present Latest Sensor R&D

36980339b Leinfelden-Echterdingen EEE in German 24 May 88 p 26

[Text] Nuremberg—The Fraunhofer-Gesellschaft was once again represented at the international sensor exhibition'88 this year in Nuremberg. Six Fraunhofer institutes presented new research results in sensor technology.

The Fraunhofer Institute for Physical Test Methodology (IPM) in Freiburg presented three new developments: sensory analysis with Faser-Fabry- Perot, a Mach-Zehnder interferometer and a fiber-optic path sensor.

Fiber Optic Sensors

The inexpensive Faber-Fabry sensors are suitable for measuring acceleration, force, pressure, vibration, temperature, etc. The advantages of this technology lie in its freedom from interference, its compact design and its uniform, modular style for various physical test parameters.

Using integrated optics, the optic components can be miniaturized and integrated on a single chip in two dimensions. In the Mach-Zehnder interferometer, the light is fed by total reflection in waveguides that are indicated by photolithographic processes. In this exhibit, an increase in the temperature of the waveguide results in a change in the light intensity at the output.

The fiber optic path sensor was developed in order to optimally measure paths of up to approximately 1 m. Its resolution is currently plus or minus 0.5 mm, but it can be increased to plus or minus 0.1 mm. Since fiber optic sensor designs are largely distance-neutral, they make it possible to physically separate the sensory head and the transceiver, and can thus be integrated into networks and deployed in extreme environments.

From Fork Lift to Spectrometer

The Fraunhofer Institute for Propellants and Explosives (ICT), Pfinztal, presented a laser scanner for combined target and obstacle recognition. A sensor system for continuously determining the position of an automated vehicle was developed. In this way, a controlled transport process with an optimized route is possible. At the same time, the sensor system is able to recognize obstacles in a safety zone. This industrially tested sensor system is designed so that it can be built into the fork of a fork lift truck.

In another exhibit, the ICT presented "spectroscopy with acousto-optic filter." Fast spectroscopes are needed to study chemical reactions. In the prototype, the infrared radiation being emitted from molecules is guided by the acousto-optic filter and determined using a sweep generator. The spectral analysis of light is achieved without moving parts.

The Fraunhofer Institute for Information and Data Processing (IITB), Karlsruhe, presented the VISTA—Visual Interpretation System for Technical Applications—image-processing system for sight inspection, operation and image-interval evaluation. The VISTA system is equipped with video-speed special processors.

Its primary use is in testing nonhomogeneous surfaces, such as wood, floor coverings or fabrics. Through rapid evaluation of gray-value statistics, of the texture or the area, shape and distribution of the areas in question, the surface characteristics are recorded. In evaluating the

results, a distinction is made between acceptable perturbations and genuine errors. This classification job is carried out by a fast microprocessor.

The Fraunhofer Working Group for Integrated Circuits (AIS)—Division for Applied Electronics in Erlangen—showed the line camera measurement system (ZMS), an inexpensive option (plug-in card for the standard PC) for optically controlling individual production steps in real time. The system is particularly well-suited for quick inspection of surfaces and welding seams, but can be used in any area of production and quality control.

Two Other Fraunhofer Institutes

The Fraunhofer Institute for Microelectronic Circuits and Systems (IMS), Duisburg, presented work in the area of sensory analysis and sensor systems in silicon technology: for example, a CMOS microprobe for telemetrically measuring temperature and a CMOS multiplexer for silicon strip detectors.

The Fraunhofer Institute for Microstructure Technology (IMT) in Berlin, in conjunction with MBB [Messerschmidt-Boelkow-Blohm], presented examples from the specialized area of microsystems technology. The main thrust here is that the research areas of microelectronics, micromechanics and microoptics, which have thus far developed as parallel fields, should be integrated by appropriate technologies. One successful example of integrated systems is the linkage of sensor functions with micromechanics. Various sensors and actuators demonstrate the level of development in microsystems technology.

12271

BMFT's Subsidies for Joint Research on Solid State Lasers

3698m452 Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 479, 13 Jun 88 p 5

[Text]

The Federal Minister for Research and Technology

Announcement on Support for Joint Projects Within the Framework of the Laser Research and Laser Technology Focal Area of Support, April 18, 1988

1. The "Laser Research and Laser Technology" focal area of support by the Federal Ministry for Research and Technology (BMFT) provides for support of projects in joint industrial research aimed at resolving inter-firm, future-oriented questions in the area of procedural foundations for material treatment with lasers. Support here is provided for research activities that are characterized by high risk, particular complexity and high overall expense, that require a multidisciplinary approach and must be resolved jointly in a cooperative division of labor between companies and research institutions.

2. The BMFT hereby announces support for the following joint projects:

2.1 Abrading and Drilling With Solid State Lasers

The thematic focus of this joint project is to be the establishment of procedural foundations for abrading and drilling technically relevant materials with modern solid state lasers with power of up to approximately 1 kW. Abrading includes the subareas of marking, inscribing, notching and trimming. The main emphasis is on abrading and drilling metallic substances, ceramics and synthetics.

Research projects on the following subaspects can be carried out in particular:

- Basic studies on abrading defined material volumes.
- Basic studies on understanding the quantitative correlations between laser beam parameters and the result of treatment, as well as basic projects in process technology on the interaction between the beam source and the material.
- Materials-related aspects, process diagnostics, quality criteria and quality control.
- Comparisons (quality, economic feasibility analysis) and, if applicable, combination with other and/or conventional treatment methods.
- Studies and research projects with respect to technical rules, norms and standards.

Support is not provided for equipment and systems developments and projects that represent the state of the art, nor product-specific, individual applications.

2.2 Separating With Solid State Lasers

The thematic focus is to be the establishment of procedural foundations for separating metals and nonmetals with modern solid state lasers with power of up to approximately 1 kW.

The thematic focal points of the research projects are to lie in the following subareas in particular:

- Process studies on cutting ferrous materials as well as nonferrous metals (e.g., AL, nonferrous heavy metals) of different strengths.
- Process studies on cutting new materials, such as fiber composite materials and ceramics.
- Studies on effects that lead to significant problems during further processing (e.g., oxide film, formation of burrs, etc.).
- Materials-related aspects, process diagnostics, quality criteria and quality control.

- Model development on understanding the quantitative correlations between laser parameters and the result of cutting, as well as basic projects in process technology on the interaction between the beam source and the material.

- Studies and research projects with respect to technical rules, norms and standards.

Support is not provided for equipment and systems developments and projects that represent the state of the art, nor product-specific, individual applications.

3. One significant goal of the joint projects is to publish the results in a handbook in a form that can be used in industrial practice. Thus, all the data are to be prepared such that the possibilities of electronic publishing can be utilized.

4. Laser producers, systems integrators and laser users, as well as research institutes, are called upon to participate, actively and/or informally.

Special attention will be given to proposals already containing concrete ideas concerning cooperation between companies and institutes (e.g., Fraunhofer-Gesellschaft, Max-Planck-Gesellschaft, universities). Before approval is granted, a project management is to be determined by the participants in concurrence with the project sponsor, VDI Technology Center.

5. The BMFT will support the joint projects in keeping with the available budgetary resources. For support to companies in trade and industry, a private contribution of at least 50 percent is required. For grants to institutes, an industrial interest of generally 25 percent is required. This industrial interest can also be in the form of intangible services (e.g., providing special operating resources, material).

The respective administrative principles of the BMFT are fundamental. There is no legal right to support. Decisions on support will take into account support that is already under way and research projects being planned in other areas of research (e.g., Eureka projects) in terms of avoiding uneconomical parallel support.

6. Proposals for the above-named research projects, which should initially be submitted only as a project summary (in particular, subject of the subproject, goals, outline and schedule, funding needed, copartners involved) should be directed by August 15, 1988 to the project sponsor:

VDI Technology Center
Physical Technologies,
Graf-Recke-Strasse 84,
4000 Duesseldorf 1.

7. Further information and documents on support in the area of material treatment with solid state lasers can be obtained from the project sponsor, VDI Technology Center.

Contact person for the joint projects:
Dipl. Eng. Lorenz, tel. 02 11/62 14-411/401
Bonn, April 18, 1988, 423-7104-31/86

The Federal Minister for Research and Technology, on his behalf, Dr Roehring.

12271

Status, Sites of Fiber Optic Sensor Research in France

36980354b Paris ELECTRONIQUE ACTUALITES in French 17 Jun 88 p 29

[Article by G. Cuciuc: "'Fiber Optic' Sensors: Still the Subject of Much Research in France"]

[Text] "Fiber optic" sensors may be sold only in small quantities (progress in this field seems linked to some extent to equipment industrialization problems) but they are still the subject of much research and development, both by large French research laboratories and by manufacturers. This was evident at the Opto 88 symposium where a series of presentations (full session) were devoted to fiber-optic and optical sensors.

For instance, the Solid-States Physics Laboratory of the Paul-Sabatier University in Toulouse, and SNEA [Elf-Aquitaine National Company] (Boussens plant) presented their research on the use of a fiber-optic sensor for the continuous measurement of the density of particles in suspension in a liquid, in that case oil-drilling mud in a pipe located directly in the oil well.

This sensor can also be used to measure the impurity content of transparent fluids. The method adopted by the laboratory for this measurement consists in injecting light into the fluid and measuring part of the light which is scattered back by the particles. The complete device includes a fiber-optic sensor associated to a light source (5-mW HeNe laser) and to a detector (silicon photovoltaic cell with a 1-cm^2 sensitive surface). The sensor consists of two cylindrical half-shells designed to hold the ends of the two fibers (polymer or step-index fibers) so they remain parallel and butt-jointed, the straightened and polished faces of the fibers being in contact with the fluid studied. The results of this research have shown that such a sensor, based on a very simple principle and very simple to implement, is particularly well adapted to the characterization of thick fluids with a high density of particles in suspension.

Angular Sensor With Differential Coding

At the Limoges University, the IRCOM [Institute for Communications Research] (CNRS [National Center for Scientific Research] Associated Unit No 356) is engaged in the development of an angular fiber-optic sensor and associated processing, for which it receives support from the DIELI [Directorate of the Electronics and Data-Processing Industries]. This sensor is characterized by the fact that it is based on a new principle of spectral data-coding. The data is represented by the gap between two specific lines in the source spectrum. Differential coding has the advantage that it does not use a reference wavelength and therefore avoids all problems linked to a possible wavelength shift. The reference zero corresponds to the overlapping of the two lines. Another advantage of differential coding is that measurement results are less affected by manufacturing dissymmetries and temperature shifts. To decode the dual spectral data, the Limoges University researchers have adopted a method using a plane-field network in association with a photosensor strip. An appropriate mechanical device makes it possible for the network to be illuminated by light from either fiber or to remain in the dark. The signals coming from the strip, corresponding to spectrum readings, are sent to a microprocessing assembly which displays the digital value and angular position of the test body.

Current performance characteristics are plus or minus 15" for resolution with plus or minus 4° stability over the whole measuring range. Also, measurements are absolute and not much affected by the temperature. To increase the measuring range by a factor of 4 while retaining the same performance characteristics, the laboratory is contemplating using a CCD [charge- coupled device] strip with 1,024 components instead of the current 256.

Delocalized Vibration Sensor

At Photonetics SA, research involves a delocalized fiber-optic vibration sensor based on intermode interference detection in a multimode optical fiber. In the relatively simple configuration adopted by the company for its sensor, a laser source (laser diode or HeNe gas laser) is coupled to a lead-in fiber which leads the light to the sensitive fiber. The latter is a multimode fiber with a diameter larger than that of the lead-in fiber, in which many modes are excited and the variations of which will alter interference phenomena among its various modes as external conditions vary. Note that these alterations will not vary the amount of light energy carried by the fiber, but rather its spatial distribution inside the core. The electric signal delivered by the photodetector reflects directly the perturbations suffered by the optical fiber. Currently, measurements made on such a sensor (results provided by Photonetics) show, for a frequency sweep, a flat sensitivity response ranging from 6 Hz to 3.5 kHz, the upper limit being due to detection electronics. For various types of sensitive multimode fibers and receiving fibers, absolute sensitivity is estimated at 2 to 10 mV/fm (detected typical values). Such a delocalized vibration sensor already seems to offer promising applications, first for machine monitoring (current accelerometers will detect abnormal vibrations only at the set point), or for protection. For instance, they could be used to detect intruders over an entire perimeter if the optical fiber were buried in the ground.

Other research subjects in the field of fiber-optic sensors were also reviewed at this eighth Opto 88 symposium: the Solid-State Transition Elements Laboratory of the Meudon CNRS presented its research fiber- optic sensor design, using the luminescence of rare-earth ions and materialized in a prototype thermometer. The Montefiore Institute of the Liege University (Belgium) described an optical sensor that will identify the position and outline of an object. The device developed consists of a plastic fluorescent optical fiber (Optectron F201, 1 mm in diameter and 280 mm long) positioned opposite a rectangular light source. The object to be measured is placed between the optical fiber and the light source. It acts as a screen, masking part of the light energy emitted by the source toward the fluorescent fiber which transmits it to photodetectors.

Experimental results currently agree with theoretical calculations.

It is to be wished that all the above-described devices, which could meet the needs of many users, should be transferred to the industry.

9294

French Lab Develops Laser-Generated X-Rays for Microlithography

3698A287 Paris FRENCH TECHNOLOGY SURVEY in English Jun 88 p 8

[Text] LULI [Laboratory for the Use of Intense Lasers] at the Palaiseau Polytechnique (France) has defined the characteristics of a laser-generated X-ray production machine for microlithography of integrated circuits that would be economically viable in an industrial environment. The process consists in focusing a high-power laser on a metal target to create an X-plasma emission that would react on circuit resins.

LULI is studying the optimisation conditions for the production of X-rays, notably the effect of the laser parameter (intensity, wavelength, pulse duration, nature of the materials, etc.); the sensitivity of certain resins to X-rays.... Patterns of less than 0.3 micrometer have been produced. In addition to a highly precise definition, the process has a certain number of other advantages in relation to other sources: limited power and large emission surface area of conventional machines result in lengthy exposure times and low industrial yield. Finally, the synchrotrons, another source of X-rays, are complex and voluminous.

Similar studies on the use of laser-generated X-rays in the field of microlithography are being carried out in Japan and the Germans are examining the synchrotron. Apart from its application in micro- lithography, these sources could also be used in imaging, instrumentation studies in the field of X-rays, etc.

MICROELECTRONICS

June 1988 Status of Siemens' 1-, 4-Megabit DRAM Production

36980338b Paris INDUSTRIES ET TECHNIQUES in French 10 Jun 88 pp 61-63

[Article by Patricia Le Dref: "Memories: Siemens Approaching 4 Megabits"]

[Text] Through a technological agreement with Toshiba, Siemens has secured expertise in 1-megabit DRAMs [dynamic random-access memories]. It will produce 2.5 million such DRAMs this year at its Regensburg plant. Through a joint development program with Philips, Siemens has also acquired expertise in 4-megabit DRAMs which it will start producing next year.

Last 1 October, Siemens made its official entry in the very selective club of manufacturers of the most advanced memories. On that day, 3 years after the first stone of its Regensburg plant was laid, it started production of 1-megabit DRAM chips. What is the goal of the German group? It is to gain expertise in the technology used to manufacture these components and thus to be able to produce competitively any other integrated circuit. All experts agree that "because of their relatively simple structure—one transistor and one capacitor per memory bit—DRAMs have always represented excellent technological vehicles." Still, as the complexity of these components keeps increasing, their development becomes ever longer and more costly. That is why, in July 1984, Siemens went to Toshiba of Japan to acquire the technology of 1- megabit DRAMs; thanks to this technology transfer, it gained 1 to 2 years in its development efforts. "We chose Toshiba because, at the time, it seemed to be the best company as far as CMOS and memory technology was concerned. To date, this choice has proved quite satisfactory," we were told by Dr Hermann Franz, a director of the Siemens Components Division.

In Regensburg, the German company now manufactures 2,500 silicon wafers per week. Each wafer contains about 250 chips, each 54 mm^2, so that the annual production could be estimated, in theory, at over 30 million units. However, that would be overlooking yield problems. Witness the fact that Siemens expects to manufacture only 2.5 million of 1-megabit DRAMs during the 1987 fiscal year which ends next 30 September. By then, they will probably all be sold. Is that the sign of a massive arrival of the new 32-bit microprocessors? The fact is that the demand for memories of this type has been taking off in recent months. But the supply is inadequate. As a result, Siemens, whose initial goal was only to gain technological expertise, is now forced to sell its 1-megabit DRAMs. "That's quite normal," Dr Hermann Franz pointed out. But at DM30, the price for which they sold only about 5 months ago, they sold too easily. "DM 50 is more like it," he added. It is obvious that from now on Siemens will follow the trend of the market, whether up or down.

At any rate, it is a good way to write off the investments made in Regensburg: a total of about Fr2.5 billion for a production unit which is one of the first in the world to work on silicon wafers 150-mm in diameter. Built on an 80-hectare site, the plant alone has 23,000 m^2 of Class-10 clean rooms: no more than ten 0.5-micron particles per cubic foot. Considering the very small elementary- feature size of the chips (1.2 microns) and the 300 operations required to make them, dust elimination is an economic necessity.

To achieve it, the rooms are built with a false floor and a false ceiling. The air is blown downward through large pipes and circulates from the ceiling to the ground, carrying with it all dust particles. The latter then go through the false floor and are swept outside the clean rooms, after which the air is recycled. No need to say that access to these rooms has been carefully studied: overalls, shoes, hoods and masks are mandatory. All these, of course, are first cleaned of all dust. To make it easier to identify clean room workers, Siemens even provides blue overalls for men and pink ones for women. And internal regulations are stringent.

JESSI [Joint European Submicron Silicon Initiative (a Eureka project)] to Gain Expertise in Submicron Technologies

Regulations include some 30 amendments including: no make up; no contact lenses (for medical reasons); interdiction to speak when facing a silicon wafer; interdiction to move about fast or to make sudden gestures. Inside the clean rooms, the 6-inch wafers are processed in automated machines. They handle the silicon wafers directly, from cassettes containing 25 units each. Only a very small part of each machine can be seen from the clean room. All purely mechanical parts are located outside, in clean rooms of a lesser class ["gray" rooms], which makes maintenance all the easier. Batch transfer between work zones is done manually, as are some optical inspections. For a 50-wafer batch, a complete cycle through all work zones will last from 30 to 40 days, depending on the batch. Assembly and the final testing are done in another part of the building. We should mention that this production unit, which now employs 590 people, is the only one in the world to work 24 hours a day 7 days a week. It uses 5 teams working in three shifts: from 0600 to 1400, from 1400 to 2200, and from 2200 to 0600. Each team works for 6 days and then gets 4 days off.

After successfully launching its 1-megabit DRAMs, Siemens applied this technological expertise to other integrated circuits. For instance, gate arrays with "gate seas" ["mers de portes"].

In recent years, much of the company's efforts were also devoted to the development of 4-megabit DRAMs. However, to secure expertise in this field, late in 1984, a few months after its agreement with Toshiba, the German group associated with Philips in a joint 5-year R&D program, the Mega Project. With financial support from their respective governments (subsidies totaling Fr1.7 billion), the two companies then decided how to share the tasks: Philips was to develop a 1-megabit SRAM [static random-access memory]; Siemens, a 4-megabit DRAM. They would use the same 0.8-micron CMOS technology. These developments are now completed. One year ago Siemens introduced the first versions of its 4-megabit circuits. Capable of memorizing the equivalent of 250 typed pages on a 91-mm^2 area, they are using an entirely new manufacturing technique: to make integration easier, the transistor and the capacitor which constitute the elementary memory bit are now one on top of the other, the capacitor being buried in the silicon. Production of these components is scheduled to start early next year. First at Munich- Perlach where two pilot lines have been set up for that purpose. After that, Regensburg will take over. Completion of the project will have cost the German group over Fr3 billion. Nevertheless, it still lags slightly behind its Japanese and U.S. competitors which have already started or will start production this year. Still, Siemens can claim to be the only European electronics manufacturer still active in this field. It will also not fail to take advantage of its research on memory to develop advanced logic circuits, circuits for the future Integrated Services Digital Network (ISDN), and integrated automation components.

At Munich-Perlach, the 5,000-m^2 facilities employ 1,000 people. Although all are working in microelectronics, only 600 are working directly on the Mega Project. The austerity and giant size of the site—440 hectares—give it the strange appearance of a town without a soul. Possibly to make up for something missing, each building bears the name of a tree. They look just as deserted inside as outside. There is no sign of the 12,000 people who are working there. No one in the wall-to-wall carpeted corridors where the yellow doors are all closed. Everything is clean, neat, dustless. Austerity and strict discipline... and also demands to which only the Germans and the Japanese can adjust.

Now that production of the 1-megabit DRAMs is under control and the development of the 4-megabit DRAMs well advanced... the Siemens laboratories are already passionately interested in future generations. For instance, they have been working on 16-megabit memories for 2 years. They also participate in the JESSI program the goal of which is to give Old World electronics manufacturers expertise in the submicron technologies that will be required to manufacture the components of the 1995's. For instance, 64-megabit DRAMs, which will have an elementary feature size of 0.5 to 0.3 micron. Such components, however, will call for new manufacturing processes. Especially in lithography, the stage during which the blueprints of the various layers which constitute an integrated circuit are transferred to silicon wafers. At present, optical equipment is used for that operation. The 64-megabit DRAMs will probably require the use of X-rays. This is also why Siemens, Philips and the West German government have already spent close to Fr330 on the development of a synchrotron source. It is only a first step. Other long and costly research will follow.

9294

French Wafer-Scale Integration R&D Yields Circuit-Repairing Laser

36980338a Paris INDUSTRIES ET TECHNIQUES in French 10 Jun 88 p 83

[Article by Ren Honorat: "Laser to Repair Circuits"]

[Text] The LETI [Laboratory for Electronics and Data Processing Technologies] has developed a modulated-beam laser. It means a gain of 4-5 weeks in designing integrated circuits.

Submicron electronics is the height of the chip-making art. On a small 1-cm^2 silicon chip, some 100,000 or 200,000 transistors will be etched, each a few microns long. All these transistors will be connected by aluminum conductors that will also be etched into the silicon and will not exceed 10 microns in width. What happens if a speck of dust manages to elude all the clean-room filters and lands on a chip while it is being etched?

Etching a Whole System on a 4- or 5-Inch Silicon Wafer

It will make a hole that will cut off the conductors. The whole chip would have to be redone if there did not exist now a machine and a process to repair chips, at least those that are worth it.

The machine is the 8000 laser made by ESI [Advanced School for Computer Technology]; it will generate and direct a thin but powerful beam of coherent light with a wavelength of 1064 nanometers. This thin light beam acts on the faulty IC conductor like a scalpel or an electric torch. The principle is simple; implementing it much less so: the laser must be connected to a computer to position and control the beam.

The technique was developed by the LETI in Grenoble for its research on "full-wafer" integration, the process which the Americans call WSI, wafer-scale integration, and which consists in etching not 100 times the same chip but a whole system, on a 4- or 5-inch silicon wafer. The wafer then no longer supports just 100,000 transistors, but more probably 2 or 3 million; as a result,

problems will arise more frequently. The operating process of the LETI engineers is rather simple in its principle: first, make an electric test or a visual inspection to locate the fault—it is either a microcut on an aluminum track, or a short-circuit between adjacent conductors; point the laser to the fault and modulate the power of the beam.

The same technique is now used to work on the silicon prototype of a circuit. The designer can intervene and reconfigurate his circuit without having to wait several weeks for the masks to be modified. This is "real time" designing and it results in time gains of 4-5 weeks on the development of one chip.

Another possible application is the customization of gate arrays or programmable logic arrays. The laser beam is then controlled by an electronic CAD work station.

9294

Possible Italian R&D in Biochips

36980340c Milan ELETTRONICA OGGI in Italian Jun 88 p 20

[Text] A technical advisory committee that was appointed not too long ago by the minister of scientific research is examining the possibility of instituting a biochip research program in Italy. One objective of the proposed research plan is the creation of computers that would be more miniaturized, more powerful, intelligent and flexible than present-day computers and capable of emulating the processes of the human brain. The principal proponent of the Italian project is the International Research and Training Center (CIREF), in which Montedison, SGS-Thomson, and Automa, a Ligurian software firm, all participate. The term biochip is used to indicate a circuit whose electronic devices are built on substrates consisting of biological substances, such as proteins, instead of silicon, and whose capabilities are far more sophisticated than those of chips as we know them today. The use of biological molecules would also enable more intensive miniaturization than is feasible with present-day semiconductor materials. In the medium and long terms the biochip may well become a strategic component, both industrially and economically, and the CIREF initiative is to be welcomed, if for no other reason than that it will pave the way to our acquiring more know-how in the new field and more knowledge as to the potentialities it may offer to our national industry.

9238

NUCLEAR ENGINEERING

EC Research Ministers Extend European Fusion Program

3698A280 Brussels EC PRESS RELEASE in English No IP(88) 405, 29 Jun 88 p 1

[Article entitled: "Council Reaches Agreement on the European Fusion Programme"]

[Text] At the European Council of Research Ministers on 29 June, Ministers reached agreement on a common orientation for a revision to the European Fusion Programme. The agreed revision provides 735 million ECU of Community funding for the period from the beginning of 1988 to March 1992. It does, however, stretch the Programme over a longer period than was proposed by the Commission, and this will inevitably generate delays compared with the original plans formulated between the Commission and the national authorities throughout the Community, Sweden and Switzerland in whose laboratories the research is actually carried out. The Commission will do its best to minimise these delays and to maintain the leading world position of European fusion.

Ministers also reached agreement on a modification to the Statutes of the JET [Joint European Torus] Joint Undertaking which will have the effect of prolonging JET by about two and a half years up to the end of 1992.

The European Fusion Programme is an outstanding example of European cooperation. JET, the largest tokamak in the world, has so far demonstrated the best results in the field of fusion, reaching an overall figure of merit for fusion of only 5 times below what is required for scientific break-even. With JET and the specialized devices in construction or in operation in the Associated Laboratories, such as Tore Supra in France, Asdex-Upgrade and Wendelstein 7-AS in Germany, RFX and FTU in Italy, Compass in the UK, and TCV in Switzerland, Europe is firmly laying the ground for the next step, an engineering test reactor, which in Europe is called NET, the Next European Torus.

The outstanding position of the European Fusion Programme has recently been confirmed on the world level when Japan, USA and USSR agreed to make, in collaboration with the Community, the conceptual design of a test reactor called ITER, International Thermonuclear Experimental Reactor. A European technical site, Garching, where the NET Team is also located, has been chosen for the joint work. It is gratifying to note that this collaboration was acknowledged in the statement made at the end of the recent Moscow Summit. It is the Commission's firm intention to stay at the forefront of research in the field of fusion.

The common orientation agreed by ministers must now return to the European Parliament before a final decision can be made.

Ansaldo's Nuclear Plans

36980340d Milan TELEMATICA 2000 in Italian 2 May 88 p 3

[Text] Naples, 2 May—The managing director of Finmeccanica, Fabiano Fabiani, has announced restructurings of the firm's programs and of some of the operating units involved in them. These restructurings are based on the premise that, at least for now, in Italy the atom is dead. Finmeccanica is therefore not planning any further involvements in this field. Instead, Finmeccanica is looking toward the future, in terms of participating with

ENEA and Fiat in the development of fusion under the Ignitor program, and retaining interest in international research in the field of so-called "inherently safe" reactors, in which it can work together with a foreign partner. The biggest problem confronting Finmeccanica at this time is that of absorbing, without wasting, the wealth of high-level professionalism developed by Ansaldo's nuclear engineers.

9238

SCIENCE & TECHNOLOGY POLICY

R&D Projects Awaiting Industrial Applications Overviewed

3698A221 Paris TERTIEL in French Apr 88 pp 48-55

[Article by B. Clam and A. Schoen: "Scientists Open Promising Markets"; first paragraph is TERTIEL introduction]

[Text] In their laboratories, men and women are preparing the ground for corporations. The following are some discoveries in search of industrial applications.

To replace present-day biosensors—glass tubes of 1 cm diameter used, as their name implies, in biological applications—with unbreakable and inexpensive electronic chips of a few square millimeters, is the challenge set by a team from the Physicochemical Laboratory for Interfaces of the Lyon Central School. Nicole Jaffrezic has been working since 1983 on the development of biosensors based on modified electronic chips. The first practical results—i.e., functioning prototypes—herald large-scale sales within the next 2 or 3 years: "The target market, which includes personal tests sold in pharmacies as well as laboratory and hospital supplies, could yield billions of dollars in sales," she explains. This new type of biosensor is potentially capable of detecting calcium or potassium deficiencies. Properly sensitized, they can even be used to detect viral diseases.

This market alone is sufficient to arouse the interest of a number of firms. Bio-Merieux, which has financed research on virus-sensitive biosensors, holds an exclusive patent in this field. Along the same lines, the development of mineral-salts sensors has resulted in a patent for Solea-Tacussel, the Lyon company that financed the research.

In its first few years of operation, the Physicochemical Laboratory of the Central School ran on financing from only the Ministry of National Education and from CNRS (National Scientific Research Center). The Ministry of Research, ANVAR (National Agency for the Implementation of Research), and DRET (Directorate for Research, Studies, and Technologies, which is responsible to the Ministry of Defense) have added their contributions along the way. It should also be noted that electronic biosensor studies began in the Netherlands 10 years ago and are also being conducted in the United States, Japan, and the UK.

The challenge is considerable: To succeed in creating miniature sensors that are compatible with the human organism. Some defensive reactions, especially in the blood, make in vivo measurements difficult. Clinical follow-up tests performed during surgery have already been successful. The technology employed makes it possible to integrate, on a single chip, microscopic sensors for temperature, pressure, and even viruses and mineral salts. Once the process is stabilized, it will be possible to manufacture large quantities of sensors, even very sophisticated ones, on production lines identical to those currently used only for electronic chips.

For the time being, the Swiss Microtechnical Institute is supplying the "raw material" to the Central School laboratory, but large-scale production will require close cooperation with a components manufacturer.

Superconductivity, distinguished last year by a stunning Nobel Prize in physics, has been rejuvenated. By discovering a whole new generation of superconducting materials, Georg Berdnoz and Alex Mueller have triggered a real ground swell among scientists.

Superconductivity is a physical phenomenon that has been known for almost 80 years. It is manifested by the sudden disappearance of electrical resistance in materials that have been cooled below a certain "critical" temperature. Possible applications for superconductivity are tremendous. Mechanics have dreamed of eliminating physical friction through superconductivity by means of magnetic levitation. Electricians, on the other hand, have in mind high-tension power lines free from electrical losses. All these projects have had to be aborted, because, until 1986, all known superconductors had very low critical temperatures, close to absolute zero. They needed expensive cooling through immersion in liquid helium.

The discovery by Georg Berdnoz and Alex Mueller constitutes spectacular progress in this area. The high-critical-temperature superconductors they discovered require less extreme temperatures. They can be cooled by liquid nitrogen, a less expensive coolant than helium.

Alain Fevrier, a CGE [General Electricity Company] research scientist at the Marcoussis Center, has been working on superconductivity since 1960. He remains cautious with respect to the new materials awarded the Nobel Prize: "These YBaCuO-type superconductors are made from metal oxide powders. They only tolerate very low currents. They cannot be used yet." A graduate of Supelec [Advanced School for Electricity Studies], he is betting on the conventional superconductors, but in a new field: 50-hertz alternating current.

"Superconductivity has already made its mark in direct-current application such as particle accelerators and nuclear magnetic resonators (NMR). We have made three prototype machines that substantiate the interest in superconductivity in alternating current mode." A conducting wire was the basis for the developments by Alain Fevrier's research team. In 1983, his laboratory, in cooperation with Alsthom, developed the first "multifilament strand" with losses sufficiently low to be used in alternating current. The Marcoussis team has done superior work: One strand includes up to 250,000 filaments, each 0.1 micron in diameter. This strand, which is composed of a ductile niobium and titanium alloy, has fulfilled its promise. Alain Fevrier has used it to make coils for generator, transformer, and current-chopper prototypes: "The performances of these machines are stupendous. They foreshadow the arrival of a new type of electrical engineering. We must invent it," concludes Alain Fevrier enthusiastically.

Eat the modern way, eat healthy food! Certain substances derived from cereals and vegetables make it possible for the food industry to prepare new products containing less fat. These substances are the proteins which play a major role in the makeup of all living organisms. Each protein has its own special properties: Some of them can be used to boost water retention in food or to stabilize emulsions (such as sauces).

A team of research scientists under the direction of Jacques Gueguen, director of the Laboratory for Biochemistry and Protein Technology at INRA (National Institute for Agronomic Research) in Nantes, has been working on the subject for 2 years. Its work, which is directly related to the new French eating habits—frozen food, ready-made meals—does not yet seem to have excited the food industry: Funding comes almost exclusively from the Ministries of Research and of Agriculture. Nevertheless, the principle appears to be interesting: Modification of the structure of vegetable proteins brings about a modification in their properties. Thus, a single raw material can yield many new products with unique characteristics. "French eating preferences lean toward animal proteins," comments Jacques Gueguen. The "protein man," as his colleagues call him, has, however, done everything to promote these well-known vegetable proteins. As early as 1975, he began researching a substitute for soy-oil cakes, which were then being imported solely from the United States and Brazil. Cultivation of fodder peas (very similar to the well-known "green peas"), unknown in France at the time, was then begun; proteins for human consumption can be extracted from them. Concentrated powders containing up to 90 percent active substance were produced. In 1987, France produced more than 1 million tons of fodder peas which were earmarked exclusively for cattle. However, the French food industry has been hesitant to break up this new raw material into its various components (starch, dietetic fiber, and proteins) for human consumption. Readers will undoubtedly remember the commercial failure in France of the soft drink Rivella, introduced as the "Swiss Coca-Cola," although it was very successful in its country of origin. The reference to "casein" (a natural component of milk) on the label was enough to turn off potential French buyers. Nevertheless, growing fodder peas made it possible to limit imports of soy-oil cakes.

The computer is a powerful, multipurpose tool: It calculates, sorts, compares, analyzes, and stores all kinds of data with great efficiency. However, one cannot count on the computer to educate or evaluate itself; these are human intelligence functions which are beyond the computer's reach. Artificial intelligence techniques—essentially software programs—enable the computer to imitate some human reasoning or to recognize certain shapes, but nothing more. Nonetheless, in laboratories throughout the world, scientists have always dreamed of building machines based on the model of the brain, which would be capable of reproducing "human" behavior.

Gerard Dreyfus, electronics professor at ESPCI (National School for Physics and Chemistry in Paris), was one of the first European scientists to become involved in "neural networks." These electronic structures were given this name in analogy to the nervous system. He explains: "When the ESPCI Electronics Laboratory was created in 1982, I wanted to launch an activity dedicated to shape recognition. I began with a simple idea: To produce a fast, low-cost system for handwritten character recognition and make it available to everyone." The trigger that pushed Gerard Dreyfus' team to study neural networks was a fundamental discovery in 1982 by John Hopfield, a Bell Laboratories chemist and biophysicist. Hopfield had determined that the mathematical formulas and models used in statistical mechanics to describe interaction energies in certain materials could be applied to the dynamic description of a neural network.

From this, the ESPCI laboratory deduced a learning rule which has been adopted by a great many scientists. This rule guarantees the restitution of a memorized model according to the perfect-student syndrome: Beyond a certain threshold, a network whose design is based on this rule refuses to learn additional information, but does not destroy previously acquired information.

The neural network, which has this learning ability, is able to associate incomplete, even distorted, information with information memorized earlier. The electronics laboratory applied this principle to handwritten-character recognition by simulating the operation of the neural network using a conventional computer. The rate of recognition is about 80 percent. In principle, then, all shape-recognition problems can be handled by neural networks. "But industry is still reticent, because it has not been possible to prove that neural networks yield better results than conventional computers. However,

Siemens experts noted that it took them only 3 months to develop a voice-recognition application with a neural network, whereas it had taken them 3 years with artificial intelligence methods."

In the United States, a number of companies which have adopted the neural method have sprung up recently. Apart from Synaptics, which is working on the physical development of a neural network in silicon, other companies have developed cards which allow the simulation of a neural network using a high-capacity microcomputer. Nevertheless, this wave of industrialization has not taken place in France, despite its particularly dynamic research efforts. Neural networks have not yet proved themselves completely, but they show promise. Gerard Dreyfus adds: "If we were more familiar with industry's critical problems, we would undoubtedly find hitherto unconsidered applications." A helping hand has been extended....

Image transmission via a telecommunications network is not a technical problem in itself. Nevertheless, this operation requires 1,000 telephone lines! Image communication technology stumbled on a major problem at its inception: A digitized image contains too much information and is not suited to transmission through a telephone network without modification. In spite of this initial handicap, the videophone has become a reality.

In the research center of CNET [National Study and Telecommunications Center] in Issy-les-Moulineaux, Jacques Guichard smiles one last time at his interlocutor in Stockholm before the latter's face disappears from the screen. The videophone is already a valuable working tool for the head of CNET's image communications department. This type of equipment could be available to the general public within 5 years.

"Potential videophone users tend to believe that sound and image are of equal importance in communication. Thus, we have tried to transmit picture and sound over a single carrier," explains Jacques Guichard.

The scientific challenge has been facilitated over the past few years by changes in telecommunications network equipment. "Many countries have recently begun modernizing their telephone networks through digitization. They will soon be able to offer subscribers two high-speed channels (64 Kbits/s) and a third, slower channel (16 Kbits/s) for ISDN (integrated services digital network). It was tempting to use one of the two high-speed channels for speech and the other for the image," Jacques Guichard says.

However, it was still necessary to compress the enormous amount of image data: The data rate required to transmit a video image is on the order of 140 Mbits/s, while the high-speed channels offered to subscribers cannot handle anything higher than 64 Kbits/s. Jacques Guichard and his team succeeded in solving this problem by developing image-coding algorithms. This coding is based on a simple observation: A television image is generally repeated from line to line and from image to image. It seemed possible to reduce this redundancy, and therefore the data rate, by preserving only the useful data.

The research teams did not reach the 64 Kbits/s threshold adopted for the videophone on their first attempt. Research conducted a few years ago into the similar problem of videoconferencing constituted a major step. European cooperation then resulted in a 2-Mbits/s standard. "And we have made enormous progress since then," asserts Jacques Guichard. CNET has already built several videophone prototypes, and it is studying a new model equipped with a liquid-crystal display which has been developed by the Lannion research center. However, videophones are still far from their definitive configuration. They will undergo many changes before being placed at the disposal of the general public in 1992: Their coding system is in full development. The imminent introduction of the videophone is a godsend to the telecommunications industry. Although the market of consumer equipment will probably be grabbed by the major companies—production runs will exceed hundreds of thousands of sets—there will still be fantastic opportunities involving professional equipment requiring specific adaptations. It is up to the small- and medium-size high-tech companies to play their cards right!

Scientists stir cells to oxygenate them; why not teach them to swim? By cloning the genes that enable cyanobacteria (also called "blue algae") to float, Thierry Damerval, a young research scientist at the Pasteur Institute, has just proposed a fascinating model for solving one of biological cultivation's biggest problems. Because of their fragile nature, the cells used in most bioindustrial processes have very poor toleration of the agitation required to optimize their production. The genetic tinkering done by Thierry Damerval—and patented by the Pasteur Institute—in cooperation with an Institute team and a U.S. scientist, opens up a new way to solve the problem of stirring biological cultures. An animal cell that once would have sunk becomes a small "buoy" through the grafting of a few genetic sequences onto it. The flotation is due to gaseous vesicles that are coded by the sequences grafted onto the cell. This genetic coding, which was carried out on "Escherichia coli" in 1986, can be performed on any cell and can therefore be used in many industrial processes.

The appearance of gaseous vesicles in cyanobacteria is a biological curiosity. Thierry Damerval is intrigued by it: "It is similar to a survival behavior. The vesicles appear when the medium is depleted. They enable the cyanobacterium to extricate itself and look for more favorable conditions." But this young scientist is fascinated even more by the genetic coding of this characteristic. An intellectual with the Ecole Normale Superieure de Saint-Cloud, Thierry Damerval speaks enthusiastically of his first research experiment at the Pasteur Institute. The

discipline is new and in full bloom. The level of knowledge reached in genetics has already brought about small revolutions in medicine as well as in bioindustry. But the key problems, such as cell differentiation, still defy understanding.

25053

EC Commission Investment Fund for Industrial Cooperation

3698M371 Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 478, 27 Apr 88 p 10

[Text] EC market fragmentation still poses major difficulties to enterprises pursuing multi-national cooperation. The EC Commission has therefore put forward a series of measures aimed at improving the general conditions for multi-national cooperation between enterprises. The proposals have now been submitted to the member states' governments and to the European Parliament for examination.

At present multi-national projects face numerous financial, legal and fiscal obstacles in the Community. The Commission's statement points out that the need for financing for multi-national industrial projects is growing steadily as a result of rapidly increasing research spending. As many enterprises cannot afford the required investment capital, traditional financing mechanisms are largely inadequate.

The Commission therefore supports the creation of a specific investment instrument designed to provide financial support to technological projects involving partners from several member states. Only private bodies will be charged with coordination. The Commission also envisages the creation this year of a data bank to inform interested partners in the scientific and economic sectors on financial support opportunities within the framework of common research projects. However corporate legislation will have to be harmonized if this objective is to be attained. Multinational projects are particularly hindered by the existence of very different tax systems at national level. In an attempt to solve the legal, fiscal and financial difficulties, the Commission calls for the creation of the European joint-stock company, for the harmonization of corporate taxation and for approval of the use of the ECU in yearly balance sheets as well as for share issue and quotation.

8802/08309

EC Commission Approves R&D Exploitation Program

3698A255 Brussels EC INFORMATION MEMO in English bx;1No P-58, 10 May 88 pp 1-2

[Article: "Dissemination and Utilization of Research Results: The Effectiveness of Community Research Depends On It"]

[Text] The effectiveness of the Community policy on research and technological development (RTD), as defined by the Single European Act and expressed in concrete form in the Framework Programme, depends to a great extent on the mechanisms by which these results are disseminated throughout the economy and the regions of the Community and subsequently exploited by industry.

This issue is crucial. Although the quality of Europe's contribution to science is universally acknowledged, Europe's ability to promote economic growth by converting the fruits of science and technology research into new or improved goods, processes and services is giving cause for concern.

Community RTD programmes concentrate on the precompetitive phase of the innovation cycle, while at the same time aiming to improve the competitiveness of European industry. It is industry's task to convert the results from the programmes into products and processes for the market. The aim of the specific programme for the dissemination and utilization of results from research and technological development, which has just been approved by the Commission for transmission to the Council, is to facilitate that conversion process.

This programme is consistent with the objective of completing the large internal market by 1992 in that its purpose is to exploit the innovatory potential in Europe and increase cohesion, by doing more to ensure the dissemination of results in those Member States with less well-developed research and innovation infrastructures.

As the Commission Vice-President, Mr Karl-Heinz Narjes, explained when presenting the programme, this is a horizontal action aimed at the dissemination and utilization of all RTD results from Community programmes. It is an essential additional element if our programmes are to produce practical benefits.

This is to be done, first, by optimizing the dissemination and utilization of the results of Community RTD activities through the implementation of a wide-ranging set of general measures applicable to the results from the Framework Programme and, secondly, by making provision for close collaboration between teams and individuals throughout the Community via efficient computer-communications networks which will transmit the information they require and give access to their results, thus stimulating the processes of innovation and the industrial exploitation of research results.

The Commission's proposals in the first of these areas cover both the results which belong to the Community and those which do not, i.e. those arising in the main from shared-cost contracts; they also cover results which can be rapidly exploited and those which appear unlikely to be exploited commercially or otherwise in the short to medium term.

The general measures proposed for the dissemination of results fall into four main categories:

- the making available to the specialized public, community institutions and national administrations of information on community RTD programmes and projects by both traditional and electronic means;

- the identification, screening and protection of results coming from Community programmes;
- the dissemination through the Community by traditional and electronic means of those results judged not to be exploitable in the short to medium term, but which can make a substantial contribution to scientific advances;
- support for the active exploitation of results through a wide-ranging set of measures designed to produce a substantial improvement in quantitative and qualitative terms in the process whereby these results are transformed into new economic activities.

This programme will consolidate the Commission's current activities in this field, which it presented to the press at a meeting held in Luxembourg on 28 and 29 April 1988.

As for communication networks, the services provided over such networks are typically messaging, data-base access, file transfer and access to specialized programmes on remote machines. The main objective of the proposed measures is to contribute to the creation of a common integrated communications infrastructure and associated services, accessible to the various public and private research centres in Europe. These measure will improve synergy between researchers and lessen the negative effects of distance, paticularly in the peripheral regions.

In concrete terms, the proposed specific programme will enable the Commission's services to continue and reinforce their technical cooperation with and finanical support for the RARE (Reseaux Associes pour la Recherche Europeenne [Associated Networks for European Research]) association and the EUREKA [European Research Coordination Agency] COSINE project (Cooperation for Open Systems Internetworking in Europe), both of which promote OSI (Open Systems Interconnection) standards with the aim of creating a common OSI-based computer communications infrastructure.

The cost of the Commission's proposals will be ECU 38 million. The remainder of the ECU 55 million earmarked in the Framework Programme for implementing these actions is set aside for financing linguistic actions both present (i.e. the EUROTRA programme) and future. The Commission is proposing that the programme should cover an initial period of four years up to 30 June 1992.

EC Adopts Program To Support Emerging Technologies

3698A277 Brussels EC PRESS RELEASE in English No IP(88) 411 29 Jun 88 pp 1-2

[Article: "EC To Promote Electronic Learning Technologies, DELTA Programme To Be Launched"]

[Excerpts] The Council of Ministers of the European Community today adopted the DELTA programme—Development of European Learning through Technological Advance—which is to be a collaborative research and development programme of the European Community.

The Council decision carries over a 24-month "Exploratory Action," with a contribution of ECU 20 million from the community budget. This amount represents half of the cost of projects to be launched. The other half would come from project partners in the commercial, public and in the academic field. DELTA projects require the participation of at least two independent partners in two different Member States. One of them must be a commercial enterprise. Following the example of other EC research programmes DELTA also allows for partners from EFTA countries to collaborate.

One partner must represent the requirement of learning so that every project retains the final relevance in its sights at all times. Research to be carried out under the DELTA programme must be pre-competitive, meaning that cooperation aims at the development of emerging technologies rather than at the development of marketable products. This formula allows companies who compete in the market-place to collaborate, without their will or their ability to remain competitive being affected.

DELTA research is furthermore intended to be incremental. This means that DELTA will not seek to reinvent the wheel or the personal computer. DELTA will support research and development required to enable the emerging technologies to be utilised for the benefit of learning. Devices and technologies to be dealt with include: more powerful processors, including image processing; larger and cheaper storage with new techniques of data organisation; direct broadcasting by satellite, the integrated Services Digital Network (ISDN); artificial intelligence, access by near-natural language, etc.

Following the Council decision the EC Commission will now prepare a public call for proposals inviting interested and qualified partners to submit project proposals.

The Commission requests project-proposals to be submitted by the end of October. The subsequent evaluation and contract negotiation should allow DELTA projects to become operational towards the start of 1989.

DELTA examines the technological advances which are expected over the coming decade and proposes a programme to use them for the benefit of learning. The DELTA programme will focus on five action lines:

Action Line 1 is a concentration on requirements by the construction of a Learning System Reference Model, which will also serve the planning and management of the programme.

Action Line 2 provides for the collaborative research and development of the equipment and systems required—both hardware and software.

Action Line 3 comprises testing and validation, including the communications, an important component is SOFT—Satellite Open Facility for Testing—aimed at the use of satellites for learning.

Action Line 4 has the objective of interoperability—i.e. support for the participation of the learning interest in the ongoing work on standards of all sorts.

Action Line 5 seeks the creation of favourable conditions for learning.

New EC Research Programs Adopted

3698A279 Brussels EC PRESS RELEASE in English No IP(88) 404, 29 Jun 88 pp 1-2

[Article: "The Council Formally Adopts Several New Research Programmes]

[Text] Once the European Parliament had delivered its opinion on their second reading, the Council today formally adopted five new research programmes on which it had reached a joint position at the Research Council on 11 April. Among these programmes, which are intended to form part of the framework programme for technological research and development (1987-91) we may mention the following:

1. The SCIENCE programme (1988-92) (Stimulation of the International Cooperation and Interchange Needed by European Research Scientists)

This programme is the—more ambitious—follow up to the programme known as the "Stimulation Plan." Its aim is to raise general scientific and technical levels in Europe by promoting high level cooperation and exchanges of research workers within the Community. It covers all of the exact and natural sciences and will give preferential treatment to projects that are highly interdisciplinary in nature. Indeed, one of the ends pursued is to promote research in the highly fertile areas emerging at the limits of the traditional disciplines.

A budget of 167 million ECU has been adopted for this programme. It will serve to finance fully defined research projects in high-technology sectors, the twinning of laboratories in different member states, grants enabling research workers to be attached to laboratories in a Community country other than their own, etc.

Certain research projects begun under the "Stimulation Plan" could continue within SCIENCE. There is, for example, the BRAIN neuro-informatics projects: the study of data processing systems based on the model of the human brain which, like that brain, should also be capable of reasoning, learning and changing in the light of experience. It is, moreover, already the intention to use the programme to support several aspects of research into high-temperature superconductors and, projects have already been preselected for this purpose.

2. Amendment of the Research and Training Programme in the Field of Biotechnology (BAP) (1985-89)

This amendment consists of increasing the amount allocated to the programme by 20 million ECU. This supplementary budget is basically intended to enable:

- Laboratories in Portugal and Spain, which were not members of the Community when the programme was launched, to join the programme;
- The effort involved in assessing the risks due to the deliberate release of genetically modified microorganisms to be stepped up;
- The work on bioinformatics (application of data processing to the study of protein architecture, genome sequencing etc.) to be increased and better organized;
- The training in all parts of the programme to be boosted.

The BAP [Biotechnology Action Program] is intended to improve European research potential in the application of biotechnology to agriculture and the agriculture-based industries. It covers genetic engineering, enzymatic engineering, methods of "in-vitro" testing of molecule toxicity, bio-informatics and risk assessment. On the basis of the networks and the associations built up around the various projects, BAP has witnessed the emergence of the concept and reality of Open-Plan European Laboratories": transnational associations of laboratories temporarily joined together in order to carry out multidisciplinary research with a specific aim in mind.

3. Applied Metrology and Chemical Analyses (1988-92)

This concerns a "Community Bureau of Reference (CBR)" programme intended to provide a scientific basis for the Community standardization policy that is a decisive factor in the making of the large market. The specific aim of the programme is closer agreement between the results of measurements and analyses within the Community. The budget laid down by the programme is 59.2 million ECU, which will be used to finance projects involving several types of activity: interlaboratory comparison, cooperative measurement programmes, improvements to measurements and analysis methods, improvement of high-precision instruments, etc.

The main programme topics receiving priority are:

- foodstuff and agricultural analyses (foodstuffs, hormones, antibiotics, etc.);
- environmental analyses (determination of waterborne pollutants, determination of heavy trace elements in various media etc.);
- biomedical analyses (determination of enzymes and hormones in human serum, hematological tests, analyses linked with tumour markers and medicines etc.);
- analyses of metals;

- applied metrology (measurements of length and shape, improvements to optical measurements using visible, infra-red and ultraviolet radiation, fibre-optic and laser measurements, measurement of electrical magnitudes, particularly at high frequencies, etc.).

Go-Ahead for EC Research Centers' New Program

3698A278 Brussels EC PRESS RELEASE in English No IP(88) 401 29 Jun 88 pp 1-3

[Article: "Initial Go-Ahead From the Council for the Joint Research Center's New Program"]

[Text] By adopting several decisions and a resolution, the Council has just given an initial go-ahead for the next work program of the Joint Research Center (JRC), the Community's own research center consisting of 4 Establishments located at Ispra (Italy), Geel (Belgium), Petten (Netherlands) and Karlsruhe (Federal Republic of Germany), which currently employs a total staff of 2,150, including 1,760 in the scientific and technical service.

The Council today adopted:

—A joint position on new specific JRC programs (1988-91) based on the Euratom Treaty, in the fields of radiation protection, nuclear standards and measurements and nuclear safety (both fission and fusion). Representing a total budget of 448.3 million ECU, these programs are intended to form part of the Framework Program (1987-91) for Community research and technological development activities;

—A common position on new specific JRC programs (1988-91) based on the EEC Treaty, in the fields of the environment and advanced materials. Representing a total budget of 251.7 million ECU, these programs are also geared to the main lines of the 1987-91 Framework Program;

—A resolution expressing its overall agreement with the proposals for reforming the JRC set out by the Commission in its communication entitled "A New Outlook for the Joint Research Center." The aim of these proposals is, in particular, to increase the JRC's financial independence by seeking to carry out work on behalf of other Commission departments (expected revenue: 120 million ECU) or outside bodies in the public or private sector (expected revenue: 130 million ECU). Their implementation will have the effect of reinforcing, inter alia by applying the customer/contractor principle, links between the JRC and industry, other research centers and the European scientific community as a whole, and will require the JRC to be managed more flexibly and more independently;

—A joint position on the new supplementary program for the operation of the High Flux Reactor at the Petten Establishment, to be carried out by the JRC mainly on the basis of joint financing by the Federal Republic of Germany and the Netherlands.

Under the cooperation procedure, decisions on which the Council has reached a common position still have to be submitted to the European Parliament for approval on second reading. Parliament also has an opportunity to make further comments on decisions on which a joint position has been adopted. The final decisions adopting the relevant programs will be taken not later than the next Council meeting on research, to be held in October. The practical measures associated with reforming the JRC (operation, management, contracts with outside clients, staff matters, etc.) fall mainly under the Commission's sole responsibility. Certain implementing decisions have already been taken, while others will follow in the very near future.

The JRC's New Specific Programs

With an overall budget of 700 million ECU, the new specific programs continue to account for a significant proportion of the JRC's activities. They constitute the Joint Research Center's specific contribution to the attainment of the major objectives of the Framework Program for research and technological development (1987-91) and focus on three main topics:

—Contribution to the establishment of the large internal market;

—Improvement of safety and the prevention and management of accidents;

—Monitoring and protection of the environment.

The first topic embraces all research work aimed at developing measurement methods and both nuclear and non-nuclear reference materials and work on advanced materials.

Work on the second topic relates more specifically to the safety of nuclear fission energy (reactor safety, the safeguarding of fissile materials, radioactive waste management, research on actinides and the safety of nuclear fuels), the safety aspects of fusion technology and the safety of conventional industrial activities, in particular the assessment and prevention of industrial and transport hazards.

Activities centerd on the third main topic involve research relating to the entire porblem of environmental protection as defined in the fourth Community plan of action (water, air and soil quality, toxic wastes, etc.), remote sensing as applied to the study of atmospheric and marine pollution and work on radiological monitoring.

It is planned to allocate 5 percent of the budget for specific programs to "preparatory" research activities (exploration of promising new research avenues, testing of new ideas on a small scale, etc.).

JRC Work for Outside Clients

The Joint Research Center will carry out activities funded from sources other than the 1987-91 Framework Program in two areas:

1. Scientific and technical support for other commission departments. Such activities constitute the JRC's own contribution to the major common policies: agriculture (remote-sensing applications in agriculture), environment (atmospheric pollution, water quality, major accidents), development aid (remote sensing in the coastal regions of north-west Africa and the Sahara), industry (development of building codes), energy (nuclear safeguards, energy conservation, alternative energy sources), regional policy, etc.;

2. Work performed under contract for outside bodies and organizations: operation of a facility or work on cooperative projects under contracts concluded with a Member State or group of Member States; participation in Eureka projects, performance of research work or provision of services in the context of an industrial club in which the industrial partners have to pay an enrolment fee and annual subscriptions; provision of scientific or technical services for payment, etc.

Reform of the JRC

The Commission intends to make far-reaching changes in a number of areas in order to adapt the JRC to the tasks it is to perform within the Community's research and technological development strategy:

—**Structure:** On the basis of the principle of drawing a clear distinction between program management and resource management, the JRC will be reorganized into a number of scientific institutes enjoying a large measure of scientific, administrative and financial independence;

—**Management:** The existing advisory structures will be streamlined, while the role and powers of the Board of Governors will be strengthened;

—**Staff:** A number of measures will be taken to ensure that the JRC permanently maintains a very high level of expertise coupled with considerable versatility: increased flexibility in the allocation of staff resources to different activities, an increase in the number of fellows and scientists visiting the JRC, an increase in the number of secondments from national centers to the JRC and vice versa, the creation of fixed-duration posts for post-doctoral fellows, etc.

European Coordination of High-Temperature Superconductor Research

3698A290 Paris FRENCH TECHNOLOGY SURVEY in English May 88 p 1

[Text] Five major European research organisations, Centre National de Recherche Scientifique (CNRS-France), Consiglio Nazionale delle Ricerche (CNR-Italy), Deutsche Forschungsgemeinschaft (DFG) and Max Planck Gesellschaft, both in the Federal Republic of Germany, and the Science and Engineering Research Council (SERC-Great Britain), have just set up a permanent committee to facilitate cooperation in the field of high-temperature superconductors. The introduction of a fast system to circulate information (results, financing conditions, researcher or equipment exchanges, work meetings, etc.), is one of the targets that has been set for the new committee. It is also hoped to create a network of experts on a European scale with a view to evaluating major research projects.

Difficulties, Failures of EUREKA Program Described

3698m417 Milan ITALIA OGGI in Italian 24 May 88 p 19

[Article by Elysa Fazzino: "Why the EUREKA Program Now Risks Failure"]

[Text] Brussels—EUREKA does not work. The technological challenge launched by Europe against the United States has given very few concrete results. Beset by financial difficulties, the program is undergoing a crisis of confidence: the cooperation among European industries is breaking up and the key projects are failing. The sixth EUREKA ministerial conference, scheduled to be held in mid-June in Copenhagen, threatens to be overshadowed by the possibility of a "crash."

In preparation for the meeting, the "group of top resprsentatives" met recently in the Danish capital and came to a disturbing conclusion: from scattered bits of information it emerges that a number of the projects launched have failed, although the lack of clarity in the program makes it impossible to assess the extent of this phenomenon with any accuracy.

Why EUREKA Is In Crisis

Of the 169 research projects launched under the EUREKA program, how many have floundered? This is not an easy question to answer. The companies involved, and particularly the less strong ones, are reluctant to admit to failure or are making vain attempts to resurrect projects that have been aborted. Some of the people involved have even gone so far as to maintain that some of the projects continue to receive financing even though they have actually been abandoned. The experts have tried to formulate a strategy to stem this "hemorrhage." At this point, however, only one thing is certain, which is that EUREKA is in crisis.

This extremely negative analysis arrives just at the moment when the EC's framework program for the 5-year period 1987-91 is really taking effect, with numerous initiatives being launched.

The pendulum of research in Europe, which appeared to have swung in favor of EUREKA while the community was in the midst of the financial crisis, has now wung away again. However, the pessimistic evaluations of the outlook for EUREKA need to be assessed with a certain amount of prudence. These evaluations have been generated in Brussels, the headquarters of the program, and within the community they are fueled by long standing rivalries and frequently reiterated criticisms (for example, the risk of overlapping between the EC initiatives and those promoted by "the 19," or in other words, the EC countries, the members of EFTA, and Turkey).

The Projects Launched Have Cost 6 Trillion Lire

Created in 1985 at the initiative of French president Francois Mitterand, EUREKA was intended to constitute Europe's response to the "star wars" (SDI) of the United States. In 3 years, 19 countries as well as the European Commission, have become involved in the ambitious program, which has launched projects for a total cost of 4 billion ECU, equal to approximately 6 trillion lire.

In theory 20 percent of this sum should be provided by government, but the wealthier countries participating in the initiative are now starting to tighten their purse strings. With the result that EUREKA is now forced to turn to the EC.

However, in Brussels the vice-president of the European Commission and head of industry and research, Karl-Heinz Narjes, is extremely perplexed. It is well known that the European Community has just about enough money to continue with the 5-year community research program that will consolidate the efforts of the 12 nations up to 1991.

Despite the fact that over 9 trillion lire has been allocated, the commission's desire that ESPRIT—the program for research in information processing technologies—should be successful will probably induce it to ask governments to increase their contributions, given that the available resources cover the cost of only one-eighth of the projects considered.

Narjes is worried that money given to EUREKA will be taken from community programs that have already been tried and tested. In addition, the commission does not intend to give a single cent to EUREKA unless in exchange it is allowed to manage project implementation. In short, the EC is anything but enthusiastic about the idea of greater financial involvement. This problem will be dealt with at the next meeting of the research ministers, to be held in Luxemburg on 29 June. EC observers believe that it will be necessary to create new foundations for EUREKA.

In a report to the European Parliament, the member of the European Parliament Glyn Ford criticized the fact that the program has deviated toward pure research, when it was established with the intention of supporting precompetitive research. All in all, it is hardly surprising that there is growing friction between the industrial partners.

The Most Serious Failures

The failures in the EUREKA program which have come to light so far are the following:

—**JESSY:** This is the most recent project to be destroyed by a quarrel between the industrial partners. The objective was to develop a new generation of integrated circuits for the 1990's. The participants in the project were the Netherlands firm Philips, the FRG firm Siemens, and the French company Thomson (with the latter participating through its Italian company SGS).

This was the continuation of the MEGA project which Philips and Siemens had intended to propose within the framework of EUREKA but had then decided to implement alone. In the case of JESSY also, the two companies now want to "go it alone;" they want to cut out SGS, maintaining that the Italian company does not have the necessary level of technology to participate in the project.

Rumor has it that SGS has sought the support of Jacques Delors, president of the European Commission. It is an extremely important project in financial terms: the total cost is approximately 2 billion ECU, equal to about 3 trillion lire; the first phase, which must be completed by the end of this summer, has cost 3.6 million ECU, equal to 5.4 billion lire.

—**Educational Computing Project:** intended to develop educational computing, this project has come to nothing as the result of a lack of cooperation between the companies from different countries.

Initially there were three partners: Olivetti, Acorn Computers, and Thomson. Olivetti then bought Acorn Computers, and Thomson dropped out.

—**Compact Vectorial Mini-Computer:** the objective of this project was to develop a 100-megaflop system (that is, a system capable of performing approximately 100 million operations per second).

The project leaders, Norsk Data and Matra, terminated the alliance, and Matra has now constructed the supercomputer on its own.

—**Wide Band Telecommunications System Development:** Cit Alcatel, Plessey, and Italtel were to have developed components, interfaces, and other hardware and software for wideband telecommunications. However, Alcatel withdrew and the project was abandoned. Plessey has now taken up the project again under the new name of "Optical Transmission" and is working in collaboration with another partner, the Swedish firm Ericsson.

—**Optical Disk Storage System:** the project failed together with the project leader Thomson-Alcatel Gigadisk (joint subsidiary of Cit Alcatel and Thomson-CSF).

08616

Details on New EUREKA Projects With French Participation

36980355b Paris ELECTRONIQUE ACTUALITES in French 24 Jun 88 pp 2

[Article: "21 New EUREKA Projects With French Participation"]

[Text] Twenty-one new EUREKA projects with French participation (participants such as Thomson, Matra [Mechanics, Aviation and Traction Company], Aerospatiale and Sormel) were adopted at the sixth ministers' meeting of the EUREKA European cooperation program which took place on 15-16 June in Copenhagen.

These 21 projects (out of a total of 54 new projects adopted) represent a total investment of Fr1.38 billion; Fr577 million will be provided by France (33 percent by the French government, the rest by the participants).

Four of the 21 projects have to do with automated assembly workshops: for car clutches (with Valeo; a 4-year Fr131-million project), gas flowmeters (with Sormel; Fr168 million over 5 years), refrigerators (with Selnor, a subsidiary of Thomson Household Appliances; Fr60 million over 4 years), and shoes (with Imbert, Fr43 million over 4 years).

In the field of computer-integrated manufacturing, we should also mention a computer-aided production management project in the aeronautics sector (with Aerospatiale; a 1-year Fr28-million project, definition stage), as well as a CO^2- and YAG-laser project with Air Liquide (Fr140 million over 5 years). This project covers in particular the development of YAG machines.

The Matra group is a partner in a rather large project (Fr176 million over 6 years) involving the development of a process to purify biotechnology products, with qualification and optimization to take place on earth and in space.

Also, a "steerable aerospace module" will be developed under another project in which France is represented by the Phenol Engineering Company: a 1-year Fr5.3-million project for the initial feasibility stage.

Another project was adopted, also for a 1-year definition stage, with the participation of the French company Eca; it covers an automated system to inspect, maintain and repair the submerged parts of marine structures.

The Bertin company is represented in two other projects which were adopted in the Danish capital: one covers an automated system for paraplegics (Fr88 million over 4 years); the other programmable controllers for molecular biology (Fr52 million over 2 years, for the definition stage).

As far as software is concerned, we note a project covering tools to be used to control the quality of software under development. The French quality-control company CEP [Control and Prevention] is a partner in this 4-year Fr36 million project.

Finally, we should mention a 3D image-synthesis and computer-aided TV filming project (with TDI as a participant; Fr55 million over 5 years), and another project to develop electronic controls for the electric motors used to operate shutters, store awnings, etc; the French company Somfy will participate in this 6-year Fr60-million project.

9294

ESPRIT First Call for Bids for Basic Research

3698M346 Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 477, 13 Apr 88 pp 11-12

[Excerpts]

1. Background

The Commission herewith publishes the first bid for submission of proposals for fundamental research projects within the framework of the European strategic research and development program in the area of information technology.

In the light of the impetus and achievements of the first phase, the Commission has opened the second phase of ESPRIT (1987-1991). The second phase envisages precompetitive industrial projects involving three strategic sectors:

—microelectronics and peripheral technologies,
—information processing systems,
—IT application technologies.

In addition, the second phase of ESPRIT includes a new element, projects in basic research.

2. Bid for Submission of Proposals for Projects in the Area of Fundamental Research

The submitted proposals are required:

—to involve especially promising cooperative fundamental research in selected IT sectors,

—to comply with the conditions envisaged in the first bid for submission of proposals for ESPRIT projects in the area of fundamental research, contained in the 1988 information packet,

—to comply with the procedures and the provisions laid down in the 1988 information packet,

—to specify corresponding activities to be started or already in progress either at national or international level. In these cases the envisaged cooperation strategy must be specified.

Projects in the area of fundamental research must clearly involve fundamental aspects of microelectronics, data processing, artificial intelligence and cognitive science, with the following priorities:

—optical computers, electronic properties of organic substances, quantum electronics, low-temperature electronics and superconductivity,

—formal methods of software engineering; computer logic and computer algebra; functional, logical and object-oriented programming languages; distributed algorithms and protocols; reliability; complexity; parallel systems; data banks,

—learning, knowledge communications, new concepts for logic, argumentation, speaking and natural language, advanced image recognition, multisensor functions, coordination of perception and motory processes, autonomous systems, symbolic and subsymbolic calculus, man/machine interaction.

3. Scope of Application of the First Bid

The EC contribution to the projects to be selected from the submitted proposals is expected to total 35 million ECU. A project can cover up to a 5-year period. The contracts offered to successful applicants will apply to the first two to three years of a project's life span as a general rule. If appropriate the first contracts will apply just to the definition phase of the proposed projects.

4. Content and Form of the Proposals

Details concerning the content and form of the proposals are contained in the information packet, which also includes background information and suggestions for applicants, so as to enable them to provide the necessary information for the evaluation of proposals with regard to the specific objectives of ESPRIT projects in the area of fundamental research.

As fierce competition between applicants is expected, only proposals that are carefully worked out and in compliance with the criteria laid down in the information packet should be submitted.

5. Information for the Applicants

Before submitting their proposals, applicants should read the following documentation:

—the present bid,

—the 1988 information packet for ESPRIT actions in the area of fundamental research.

The said documentation has already been widely distributed. Further copies can be obtained from the address below.

6. Submission Deadline

Provisions and procedures concerning the submission of proposals are contained in the information packet.

The deadline for the submission of proposals is 13 June 1988, 5 p.m. Proposals, clearly marked "ESPRIT Projects in the Area of Fundamental Research," must have reached the following address by that deadline:

Commission of the European Communities,

DG Telecommunications, Information Industries and Innovation

ESPRIT Proposals Office A25,

Rue de la Loi 200,

B-1049 Brussels.

The Commission reserves the right to reject any proposal sent after the said date.

7. Communication of the Intention To Submit a Proposal.

Applicants should communicate their intention to submit a proposal (information packet, p 11) as soon as possible and in any case by 15 May. Additional details are contained in Annex 1 to the information packet.

8. Address for Further Information

Commission of the European Communities,

DG Telecommunications, Information Industries and Innovation

ESPRIT Operations Office A25-7/11,

Rue de la Loi 200,

B-1049 Brussels.

8802/08309

President of FRG's Fraunhofer Group on R&D Policies, Funding

Relations With Government, Industry

36980339a Landsberg MODERNE FERTIGUNG in German Jun 88 pp 40-41

[Excerpts] In recent years, the Fraunhofer-Gesellschaft has experienced rapid development. Thus far, more than 1,800 contracts from the public and private sectors have been handled. The president of the Fraunhofer-Gesellschaft, Prof Dr Max Syrbe, explains the work and goals of the Fraunhofer institutes.

MODERNE FERTIGUNG: National politicians like to view the Fraunhofer institutes as billboards for their research policy. Do you see this as an honor for the Fraunhofer-Gesellschaft, or do you recognize a danger here of being roped in to do the work of others?

Max Syrbe: The industrialized nations are still in an adjustment phase. Technologies must be further developed. In addition, there are new demands, such as ecological measures. For these reasons, the industrialized nations cannot make it without a policy on industrial structure. Over the last decade, the Federal Ministry for Economics has in principle failed to create a structural policy, because it rejects planning influences on the part of the state. However, the danger of this has been in supporting the industries experiencing difficulties, instead of a process of restructuring. In the meantime, the Bundeslaender have taken over these functions. Now, applied research is always an element of structural policy. As a result, we must feel that we are involved in this, which is in principle a positive approach. The negative side to it is seen if competition that is not cooperatively oriented comes about. This could lead to difficulties. In certain areas, we can often operate only one institute. If three Laender want to have that one institute, then there are negative repercussions. We attempt to solve that problem constructively.

MODERNE FERTIGUNG: The basic financing of the Fraunhofer-Gesellschaft by the federal and Laender governments fell from 43 percent in 1976 to under 30 percent in 1986. To what extent are you attempting to further distance yourself from public financing, with all its budgetary difficulties?

Max Syrbe: First of all, why does the Fraunhofer-Gesellschaft even need public funding? This has to do with the fact that the more research takes place at the frontiers of knowledge, the more activities are not transferrable. In research, half of the money is always wasted, and you never know ahead of time which half it will be. That is, so to speak, the part that must come from the outside. The size of that part depends on the services offered to industry and on the public sector, as well as on how well it is paid. Because part of this output can also be earned above the price itself. That is the path currently being pursued by the Fraunhofer-Gesellschaft. It is also an instrument insofar as it controls our total size. As long as our services on the R&D market are in demand, we will attend to them. If demand drops, then we must limit ourselves, just like any company.

MODERNE FERTIGUNG: You must certainly be pleased with developments in research contracts from industry. They increased from 14 percent in 1976 to 33 percent in 1986 and have reached the level of DM 101 million. Work has been done on a total of 1,800 contracts. Industry has thus acknowledged the performance level of the Fraunhofer institutes. At the same time, however, there are companies that regard the activities of the institutes as competition to their own development. How serious do you think this competitive situation is?

Max Syrbe: On a psychological level, it certainly must be taken very seriously, and we are continually trying to ease this situation. On the other hand, if a company wants to maintain a good policy of innovation for itself, then it must realize that it is not expedient to want to do everything with its own R&D department. A goal-oriented company would see which areas it should work on with a reasonably large team. Other specialized areas, some of which are used only from time to time, will simply be added on. This way of planning R&D activities would coincide with our policy.

MODERNE FERTIGUNG: But surely there are projects being worked on by Fraunhofer institutes, as well as companies that must do their work in- house in order to survive on the market. If this company sees that a Fraunhofer institute is working for the competition, does this not result in an difficult situation in the long run?

Max Syrbe: Naturally these are conflicts. But they are normal conflicts that are common on the market. If people imagine that our R&D output is a product, then all sorts of things can be deduced from this. At our institutes, we are very careful about making sure that no knowledge moves laterally. Thus, everyone who works with us can assume that the knowledge that emerges during the cooperative arrangement will not be passed on further. Otherwise, our intellectual product is available to everyone.

MODERNE FERTIGUNG: You mentioned that system optimization is gaining in importance with respect to individual optimization. This implies, of course, the development of complex systems, where several departments and institutes have to work together. In terms of financing, only large companies will be able to afford this. How great is the danger here that small- and medium-sized companies will be at a disadvantage because of this development in the long run?

Max Syrbe: You would be at a disadvantage if you yourself failed to recognize that your own personnel must also expand in the direction of better qualifications if you are to venture into more complex product areas. I

said earlier that in regional terms, an absolute proportionality can be seen between the quantity of qualified personnel and our activity. The small- and medium-sized companies must do something about this. The Federal Ministry for Science and Technology [BMFT] has instituted a personnel assistance program, according to which scientifically trained people can work with us and then go to companies. For our part, we have set the goal of keeping the fluctuation rate of scientists to around 10 percent, in part in order to supply the economy directly with know-how. We have another program in which we support promising developments for small firms and thus make them less expensive.

MODERNE FERTIGUNG: You want to strengthen your cooperation with the Max-Planck-Gesellschaft. Do you thus want to become a sort of know-how transfer point?

Max Syrbe: We would like for the know-how that is elaborated in this country with a high level of commitment and enthusiasm to be converted into practice more quickly. I am glad that we will be starting up cooperation with the Max-Planck-Gesellschaft in the very near future, which will serve as an example to other parts of our facilities. I hope that the fear of contact between theoretically-oriented research and applied research can be gradually eliminated here.

Attitudes Toward Space R&D

36980339a Landsberg PRODUKTION in German 2 Jun 88 p 3

[Excerpts] Munich—In recent years, the Fraunhofer-Gesellschaft has experienced rapid development. In 1987, more than 2,100 contracts from the public sector and from industry were handled, with a budget level of DM 570 million. PRODUKTION spoke with the president of the Fraunhofer-Gesellschaft, Prof Dr Max Syrbe, about the work and goals of the Fraunhofer institutes.

PRODUKTION: You have criticized the amount of support given by the federal government to space research. It currently appears from the budget of the BMFT budget that this area was boosted from 1986 to 1987 to DM 1.4 billion. This is exactly the amount with which this program should be supported each year until 1989. Are there signs of a false trend here, or do you think that there are definitely opportunities here for the Fraunhofer-Gesellschaft?

Max Syrbe: In my opinion, the adjustments in our country can only be reasonably managed through a policy on industrial structure. Japan is clearly an example here. In our country, I see a certain blockade between the Federal Ministry for Economics and the BMFT, which means that research and technology policy is oriented towards large projects. At present, space is the most spectacular of these. But if you consider that significant funding is still tied up in the area of the rapid breeder, that we are thinking about large-scale magnetic high-speed train projects, that we are still investing in very large equipment for basic research, then with the overall position of a restrictive federal budget there is a cutback in those very areas that make the FRG strong. I mean the availability of a broad spectrum of know-how with an equivalently high level of technology. I fear a split between that which we are able to effect in the economy and that which the taxpayers are in fact supporting in research. I urge balance here. As far as the Fraunhofer-Gesellschaft is concerned, we have clearly seen a trend in recent years in the direction of being able to do new things essentially with Laender support, less so with federal support. Naturally, we would like to do more work with federal support. We have problems with EC projects, which are still only financed halfway. We could do many positive things in this area. There are a large number of points in which, in our opinion, a more widespread impact could be achieved with federal funding than is the case with individual major projects, which, after all, do have a very narrow target group.

PRODUKTION: So Bonn is paying too much attention to supposed ascending areas of technology, such as space, and too little to supporting competitiveness?

Max Syrbe: I would like to say something positive about space as well. The German economy has satisfied large parts of the French market. Thus, I understand that for political reasons there is a desire to strengthen branches of industry that have been sharply expanded, such as the aerospace industry in France. I am in favor of doing this in a balanced manner, and the BMFT itself is promoting this balance. But then comes the normative force of the factual. Today, anyone can see that half of the funding for manned space travel, which should be raised outside the BMFT budget, falls in here. The consequences will be serious restrictions in research and technology policy.

PRODUKTION: In which areas will the Fraunhofer-Gesellschaft become more involved in the future, and where do you want to build new institutes?

Max Syrbe: We are just now in the process of renovating our materials research area and focusing on the areas needed by industry in the near future. We will also be setting up so-called temporary scientific working groups, which often have to prove their worth as the first step towards setting up an institute. In microelectronics, we are about to operate the "Jessi" project, and in that regard to adapt our Fraunhofer microelectronics group to it. In the area of process engineering, especially bioprocess engineering, we are currently transposing a series of focal programs. In this sense, we are in the trend of technological demand.

12271

Thomson of France Announces Layoffs

36980355a Paris ELECTRONIQUE ACTUALITES in French 17 Jun 88 pp 1, 2

[Article: "Thomson-CSF Completes Its Reorganization"]

[Text] Under the restructuring plan presented recently (see ELECTRONIQUE ACTUALITES dated 17 May 1988), Thomson-CSF will lay off 1,025 of its 46,000 employees. These layoffs were announced on 13 June at a meeting of the central work's committee; they will affect in particular Cimsa Sintra [Military, Space and Aeronautical Data-Processing Company/Industrial Company for New Radio-Engineering Techniques and French Electronics], the Issy site and the technical assistance and radar systems operations. They will come in addition to the 2,500 layoffs announced in July 1987. These measures mark the completion of Thomson-CSF's reorganization around its basic trades.

According to the group, this is designed to increase synergism among its various operations, reduce its overhead and structural costs, optimize its industrial plant, and integrate its productivity gains.

At Cimsa Sintra, whose activities in the Paris area will be regrouped in Colombes, 322 layoffs have been announced.

Also, the External Work (of Saint-Denis) division will be closed, which will result in 196 layoffs at that site.

A new entity, Thomson-CSF Technical Assistance, will be created to service customers. It will integrate, among others, components from Sodeteg [Technical Studies and General Ventures Company].

Another major victim of the restructuring plan is the radar systems sector: in Bagneux, 183 people will be laid off.

The remaining layoffs are not as clearly focused and will affect a total of nine other sites.

In addition, as indicated in our 27 May issue, an optoelectronics division will be created, precisely at the end of 1988, from the General Avionics division of Issy-les-Moulineaux.

The latter will also lose its high-speed electronic instruments operations which will be added to the Electronic Systems division of Bagneux. In addition, the airborne display operations of the General Avionics division of Issy will be regrouped in Bordeaux.

Finally, we should mention that the headquarters of Thomson SA, Thomson-CSF and Thomson Consumer Electronics will be regrouped in a high-rise office building at La Defense early in 1989.

The total layoffs just announced will affect 236 workers, 327 administrative agents, 327 technicians and supervisors, and 135 managers.

9294

SUPERCONDUCTIVITY

Thin Layer Superconductors Deposited on Silicon

3698A284 Paris FRENCH TECHNOLOGY SURVEY in English May 88 p 14

[Text] A team of scientists at the Radiation and Materials Sciences Institute (ISMRa) of the French Scientific Research Center (CNRS) has developed a process by which thin layers of superconducting material can be deposited on silicon thereby opening up a whole range of new applications in the field of microelectronics.

This team already met with success last year when it managed to transmit electricity without any loss of current in a superconductor at -183 degrees Celsius, thereby making it possible to use liquid nitrogen for cooling which is far cheaper than liquid helium used up until then. Today, the team has managed to deposit a superconducting material by evaporation on silicon thanks to an insulating layer composed notably of aluminum nitride and which avoids diffusion between the superconductor and its support. A laser evaporation process in a vacuum is used to fix the superconductor on the silicon and nitride compound.

The use of silicon as a support should, according to the scientists at ISMRa, make it possible to associate superconducting and semiconducting materials and therefore develop hybrid integrated circuits. Finally, the materials used are much cheaper than monocrystalline strontium titanate used more frequently by the various research teams working on superconductivity.

Superconducting Cable Operates at Temperature of Liquid Nitrogen

3698A286 Paris FRENCH TECHNOLOGY SURVEY in English Jun 88 p 14

[Text] Thermocoax has just produced a superconducting cable called Supracoax which operates at the temperature of liquid nitrogen (80 degrees Kelvin). It is comprised of a silver sheath (external diameter of about one millimeter), filled with a previously sintered powder for the superconducting effect to occur ($YBa_2Cu_3O_{7-x}$). Measurements made with this cable give a resistance of from 10.10^{-4} Ohm (300 degrees K) to 2.10^{-4} Ohm (100 degrees K) before the superconducting state, then nil at the transition temperature (90 degrees K). Work on the level of admissible current (100 mA up to now) and the behavior in the presence of magnetic fields is currently being made. Numerous applications are already being considered: hyperfrequency circuits where the superconducting phenomenon increases the pass-band, wire in

infra-red sensors operating with liquid nitrogen, in medical imaging where helium would be replaced by nitrogen. By modifying the transition material, this superconducting cable could also be used as a level sensor for nitrogen or other gases (H, O).

French Research in High-Temperature Superconductor Applications

36980366 Paris MICRO-SYSTEMES in French Jul-Aug 88 pp 125- 126

[Excerpts] Superconductor Films

In France, a research team at the Crismat laboratory of the Caen University succeeded in depositing a "high-temperature" superconductor film on silicon by evaporation. It is a difficult operation as the deposition process requires high temperatures (on the order of 900xC), which will cause the material deposited to diffuse into the silicon. A barrier had thus to be interposed between the superconductor and the silicon. Strontium titanate has been used as a barrier in America, but it is excessively costly. Crismat decided to use a nitride layer (gallium, aluminum or silicon nitride) 0.2 micron thick. The deposition process, for which a patent application was filed by the CNRS [National Center for Scientific Research], uses a laser in a vacuum chamber.

Thomson already has some experience in thin-film technologies. At its central research laboratory, in Corbeville, one such technology—molecular beam epitaxy—was used to obtain thin YBaCuO superconductor films which are stable on silicon.

CGE [General Electricity Company] is interested in particular in the telecommunication applications of superconductors; together with Thomson, it has started to research methods of obtaining thin films.

IBM may have reservations, but the new superconductors offer still other advantages: they will work with voltages 10 times higher than the older superconductors, i.e. voltages of a few tens of a millivolt, which are far more "comfortable" to connect with silicon-based electronics. This would contribute to promote Josephson junctions. This is why Thomson researchers believe that electronic applications using the new materials should emerge rather soon. At CGE, however, people point out that efforts to develop niobium alloys (critical-low-temperature superconductors) "should not slow down."

Using Phase Transition

Jean-Louis Sabrie, head of advanced technology marketing at Alsthom, mentioned the possibility of using the phase transition of superconductors: actually, these materials can exist in two states, depending on whether they are heated to a temperature below or above the critical temperature. The transition from one phase to the other would cut off the current very fast, and this could be used to design new electronic devices (circuit breakers, current-limiting circuit-breakers, rectifiers, etc.).

CGE is thinking of using this current-increase transition phenomenon. The company recently demonstrated how it could be used. In addition, a magnetic field would also bring about very fast transitions: 1 millisecond, according to CGE.

Zero-Resistance Wires

Connectors obviously play an important part in computer systems. Now, in wire form, superconductor ceramics are very brittle. However, the technology was progressively improved and, early in April 1987, Toshiba managed to produce YBaCuO wires 0.1 mm thick and 5 mm wide.

After one year of research, Thermocoax, a company specialized in the design and production of high-technology products, recently completed the development of a prototype cable which is superconductor at the temperature of liquid nitrogen (critical temperature: 80K). Called "Supracoax," this cable consists of a silver cladding filled with superconductor YBaCuO powder. According to Thermocoax, however, further progress is still required in this field, in particular with respect to allowable current (100 mA at present) and behavior in the presence of magnetic fields. Among the applications contemplated, we should mention gas sensors, infrared detectors and, eventually, superfast computers.

At the Marcoussis (CGE) laboratories, a research team has developed a way of making multifilament strands using YBaCuO; these are wires several hundreds of meters long and 0.25 mm in diameter, made with 26-micron thick filaments.

In cooperation with the Crismat laboratory of Caen, Thomson has developed a magnetometer based on a SQUID [Superconducting Quantum Interference Device]. It has a sensitivity on the order of 1 billionth of the Earth's field.

9294

Ansaldo Activities in Superconductor Development Described

3698m445 Rome FINMECCANICA NOTIZIE in Italian No 5/117, 31 May 88 pp 9-10

[Text] In collaboration with the Institute for the Technology of Non-Traditional Materials of the CNR [National Research Council], the **Ansaldo Research Center** for the Development of Superconductivity Applications has built an electric motor employing superconductors with a high critical temperature. This achievement is second only to a similar motor developed in the Argonne National Laboratory in the United States.

The motor, which was presented recently in Milan, exploits a special property of superconducting materials known as the "Meissner effect," which in this case occurs at the temperature of liquid nitrogen, a temperature that is less difficult and less costly to achieve than that of liquid helium. The Meissner effect consists in the ability of superconductors to generate internal induced currents which limit the external magnetic field outside their own volume.

The motor is composed of two parts: a rotating part consisting of a disk on which conventional electromagnets powered by current pulses supplied using a traditional manifold are mounted; and a static part consisting of eight small cylinders made of a superconducting compound of yttrium, barium, and copper oxide which are immersed in liquid nitrogen contained in a cryostat of expanded polystyrene. The magnetic field created by each electromagnet interacts briefly with the antiguous superconductor, creating a mechanical torque which gives the motor a speed of approximately 60 revs. per minute.

It is expected that the use of the Miessner effect will lead to other developments aimed at maximizing the mechanical torque that can be obtained by the interaction of the superconductors and the magentic fields inducing the effect.

Ansaldo Superconductor Magnet at CERN in Geneva

The CERN (European Nuclear Research Committee) laboratories in Geneva have another achievement to their credit. This is the first superconductor magnet for the LHC (Large Hadron Collider) machine for the acceleration of particles, designed and constructed for the first time in the world on a joint venture basis between a research laboratory (CERN) and a partner in the industrial sector, the Italian company **Ansaldo**. The magnet exceeded the central field of 8.5 Tesla (unit of measurement of magnetic fields) on the first operating cycle, and 9 on the second.

Carlo Rubbia, director of CERN and winner of the Nobel prize for physics, defined the results of the experiment as "a success at world level." The results are certainly extremely significant, given that previous experiments had shown that it is often necessary to complete a number of operating cycles before stabilizing the magnets.

Ansaldo has acquired leading edge technological know-how in high-energy research and research in the market for superconductor magnets which now makes it the world leader in these fields. This company, which forms part of Finmeccanica [Mechanical Engineering Financial Company], supplies the LEP (CERN's enormous new accelerator ring measuring 27 km in length) with superconductor magnets, 290 of which are quadrupole and 8,000 bipolar. In addition, 242 bipolar superconductors are being produced for the FRG accelerator DESY in Hamburg.

08616

TECHNOLOGY TRANSFER

Olivetti's Computer Technology to Yugoslavia

36980340e Milan ELETTRONICA OGGI in Italian Apr 88 p 16

[Text] Olivetti and Rade Koncar, the Yugoslav agency operating in the electronics and electrotechnical sector, have initialed an agreement providing for cooperation in research, production, and distribution of data processing products on the Yugoslav market. The agreement was initialed during the Rome visit of the president of Yugoslavia's Federal Executive Council, Branco Mikulic, and provides for the forming of a joint-venture company, with head office in Zegabria, in which software engineering, system integration, and marketing specialists from both groups will operate. The initial investment, totaling some $3 million, will be shared equally, with growth of the company's capital to $13 million to be attained by plowing the profits back into the company's operations over a period of 5 years. The agreement relates to products based on Olivetti technologies covering the entire data processing sector, from personal computers to systems to automatic vending and dispensing machines.

9238

COMPUTERS

Software Study for Flexible Automation Launched in GDR

23020020c East Berlin
RECHENTECHNIK-DATENVERARBEITUNG in German Jun 88[page not indicated]

[Text] The GDR recently launched a software study for flexible automation. Key objectives of the study, entitled "Environments for the Application of Artificial Intelligence in Flexible Automation: New Tasks for the Formulation of Innovative Strategies", include:

- flexible automation of discontinuous production processes, hardware design and software production;
- investigation of artificial lintelligence (AI) for computer-integrated manufacture (CIM), design and production of VLSI circuits (VLSIC) and software production;
- development of mutually-interactive analogues and orientations in AI, CIM, software production and the computer-aided design of VLSI circuits (CAD/VLSIC), with emphasis on software components;
- analysis of selected strategically-oriented monopoly capital programs aimed at the mastery of high technologies such as AI, computer-aided manufacture (CAM), CAD/VLSIC and software production;
- and the derivation of useful conclusions for strategic planning methodology and the socioeconomic assessment of software technologies and innovations.

History of Hungarian TPA Computers

25020060 Budapest
COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 11, 1 Jun 88 p 2

[Article by Huba Bruckner: "TPA History"]

[Text] The history of computers manufactured by the KFKI [Central Physics Research Institute] goes back more than two decades. The name of the TPA computers originally derived from "tarolt programu analizator" [stored program analyzer] for the development and manufacture of computers, counted among the forbidden pleasures in our country in the 1960's. The fruit of the successful work could not be called by its true name. Our physicists visiting the Soviet Union saw what an electronic analyzer meant to their Soviet colleagues. So there could appear here also an analyzer illustrating progress, which became the basis for later computer manufacture. This was the beginning, and then in 1968 the KFKI made its first computers, which were used within the institute. But not for long, because in 1969 the BME [Budapest Technical University] and the Kando College also got them.

The thousandth TPA, an 11/540 configuration, was put into operation at the MOM [Hungarian Optical Works] on 5 May 1988—with festive trappings. The KFKI may have been celebrating the end or an era, and the MOM the beginning of a new one. The new system—which the tool development division of MOM received—will be the basis for adoption of computerized design and manufacture at the enterprise, which has a great past and is known for its optical, precision engineering and computer technology products. The leaders of the MOM, moving securely on well paying markets, know that without the introduction of computerized design (and later manufacture) they cannot maintain their positions. Today they must make products meeting the needs of customers within months, or better within weeks, or there goes the business.

The 11/500 family is the third generation of TPA's and the 32 bit 11/540 is one of the medium performance models. Terminals and other peripherals best suiting the C [CAD/CAM] techniques can be connected to the central processor with its 16 megabytes of operating memory and about 400 megabytes of disk capacity.

The deliverer and the receiver agreed that the configuration was optimal from the viewpoint of the price-/power relationship. It is true that when the 20 million forint system was being put together, the requirements of usefulness and thrift were placed in the foreground. For this reason also they are using computers compatible with the IBM PC as CAD terminals.

On the high resolution monitor screen connected to an Olivetti PC, expanded with a graphics card, they display 1280 x 960 pixels and can select 256 colors from a palette of 4,096. Each such workstation is substantially cheaper (about 2 million forints) than the Tektronix made devices with similar capacity.

Thanks to its technical parameters the TPA—put into operation with the support of the OMFB [National Technical Development Committee] and the Ministry of Industry—can serve 60 conversational workstations, although at present they are operating only two terminals. Even without obtaining a new multiplexer their number can be expanded to 32.

In the future they will install terminals in the plants in addition to the high resolution workstations for designers, all the more so as they plan to build an online and offline link between the TPA system and the NC machines.

The most important software for the thousandth TPA computer are the CAD-E and CAD-A program systems. The former is a three-dimensional modeling system to the nucleus of which they can connect various applications modules. The MOM is obtaining first the modules aiding the work of mechanical designers but later they would like to make applications programs themselves. The CAD-A is a program aiding designing and drawing. The CAD-E is better for certain tasks and the CAD-A is better for others. The ideal goal—which they would like to achieve at the MOM as soon as possible—is that the

documentation for a part, once it has been designed, should be available and reuseable at any time from a suitably constructed file. Indeed, they expect the system to be capable of exactly matching parts which should fit together, while maintaining the size tolerance standards. (The CAD-E handles individual elements with their mass so it can determine the center of gravity, inertia and many other characteristics of them.)

Computerized designing is a new area for the KFKI and the MOM, and in the future too they will rely on each other's experience and help. It indicates the commitment to CAD of the KFKI, that similar (or larger) systems are operating or soon will operate at Raba, Ikarus, Uvaterv, the MTA SZTAKI [Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences] and the BME. This last indicates that serious CAD is slowly penetrating the bastions of higher education.

The celebration champagne did not drug them either; the system put to work is a joy and at the same time it is also the source of new tasks and obligations. Handing over the thousandth computer is not only the closing of an era at the KFKI, it is also the beginning of a new one. The future belongs to distributed, multiprocessor systems; so today the name TPA, chosen at the very beginning, is expanded with new meaning and can signify "tobb-processzoros architektura" [multiprocessor architecture].

8984

Overview of Computer Fair at Kobanya, Hungary

25020062 Budapest
COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 12, 15 Jun 88 pp 2-6

[Excerpts]

Miscellaneous

It happened after the opening. A finance guard lieutenant in a green uniform accompanied by a female associate with a mass of documents appeared at the Epson exhibit. In carefully accented Hungarian, he asked the Epson representative, who knew only German, about certain unclear documents. The professional visitors to the Epson exhibit, put together with exemplary care, quietly departed the painful scene. Whatever Epson, well known in computer circles (and perhaps therefore suspicious), had done, the discreet proceedings might have been not only more elegant but probably more fruitful too, even for the lieutenant.

FAIR KALEIDOSCOPE

It indicates the animation of economic contacts between Austria and Hungary and the importance of our neighbor as an intermediary that a number of Western firms—for example Hewlett-Packard, Honeywell and Wang—appered at the BNV [Budapest International Fair] through their Austrian subsidiaries. On this occasion the Vienna TECHNIK REPORT appeared in a two-language edition.

The SZKI [Computer Technology Research Institute and Innovation Center] is preparing to establish a mixed enterprise. It will manufacture 5.25 inch floppy disks jointly with the Swedish Kopparberg Elektronik firm. They chose a method previously unknown here for market research and for testing the disks. They sent samples to computer development and manufacturing firms and to more significant users so that anyone sending their opinion to the SZKI by the end of summer can participate in a drawing this fall. They also promised that they would market the disks well below present market prices—possibly below 100 forints—and do so this year.

Since we have met with similar announcements in the recent past and since two disk factories might be too many for Hungary, we asked Csaba Faykod, director of the Rair Kft [limited liability company], what he had to say about it. He said that his original ideas had been a bit modified; they are now talking with representatives of Kopparberg about making 3.5 inch disks.

A number of commercial banks appeared at the BNV also, and not in vain. The Industrial Development Bank, the Hungarian Credit Bank and the SZKI have formed the SZKI-Sci-L Informatics Development Kft as legal heir to the Sci-L subsidiary. The base capital of the enterprise is 96 million forints of which the SZKI share is about 80 percent. The MHB [Hungarian Credit Bank] is contributing 10 million forints and the IFB [Industrial Development Bank] is contributing 8 million for developments at the computer firm and for expanding its production.

The distributor in Hungary for the Novell firm, the Walton Computer Technology Kft, has begun to sell the full NetWare product scale, including the newest SFT NetWare V 2.1 operating system. Novell Inc and the Walton Kft, a Videoton-Walters mixed enterprise, signed the contract on 20 May. A Novell training center and resale and consulting network will be formed within a few months. They also released a price list. Deliveries will take place within 3 months of a confirmed order.

At the Videoton press conference Janos Gantner said that development of a laser printer has been completed, and although they are talking with Robotron about manufacture of subassemblies, they have not yet decided when to start production. At the same time Videoton has founded a mixed enterprise, with 250 million forints base capital, to manufacture laser disks. We are informed that this mixed enterprise will work with the largest Western capital share.

The Uniboard keyboard, developed by the SZKI and manufactured and traded by the Ganz Instrument Works, received the "Outstanding Commodity" title.

The Datacoop Small Cooperative has sold to the BHG [Beloiannisz Communications Engineering Factory] the license for the cash register it had developed. Series manufacture of the register, which can be connected to a PC and which is capable of reading barcode, will begin in June. Beginning in July—Datacoop promises—it will be making ink ribbon cassettes for all printers which use cassettes. This means more than 25 types so it will not be necessary to import these products.

The SZKI announced that by fall the services of a full surface mounting line will be available to those interested. And on the basis of a French license the MEV [Microelectronics Enterprise] prepared and exhibited mounting equipment with which it will expand its previously existing services. As is well known Remix also has similar equipment. But there are not enough SMD parts and orders.

Videoton signed an 84 million ruble contract with the Soviet Union, extending to 1989, of which 35 million pertains to the export of peripherals and the rest to the export of other computer technology and electronic devices.

The world's first 1.2 version of Ventura was ready in May. So those interested in DTP [desktop publishing] did not understand why the SZKI was promising delivery only in July. Well, according to some, it is because they do not yet have hardware protection against copying.

Participation by the Novotrade Rt [joint stock company] was quieter than customary. We learned that, in possession of significant sums, they plan larger import orders. They will open a DTP service office in the near future. And they are promising to see if it is worth while to translate and publish a very thick, valuable and comprehensive work which might aid professional DTP users.

There was a lot of buying at the computer fair. We heard especially about the popularity of PC's which can be connected into a network. But the vendors are not giving out the names of the customers, saying that he who buys three units now will buy more later—and they don't want them to buy from the competition.

A list of the domestic duty value of goods which can be brought in via tourism was made public for the first time at the time of the BNV. Our joy over this glasnost is moderated only by the fact, that the duty value of computers was raised by 50-100 percent, and one still cannot learn who actually passed the new resolution, which again avoids the essence and is opposed to structural change. (The Customs and Finance Guard consistently deny their guilt.) It was said during the fair that they are also considering erasing the 10,000 forint concession.

The personnel software called KADER, of the SZKI, was produced at the best possible time. Among other things, it keeps records on passive personnel, those up for military service, those with civil defense obligations, the party members, and those about to retire. Maybe it should be developed into an expert system?

It is still not always easy to get information, especially price information. At the stand of the Machine and Tool Marketing Enterprise we were informed that prior permission from the comrade director general is needed to provide any information. The comrade director general was not on the premises.

Nor was it easy to photograph or try out the machines. Some "hid" the chief attraction of their exhibits behind a poster of cameras with red lines drawn through them. Elsewhere, beginning at two in the afternoon, they carefully closed down the computers or put out little cards lest the uninitiated cause "damage"—or get at information not intended for them.

There were three PC's at the Elorg (Soviet Union) stand. The young man sitting there guarded their secrets better than Poppa Tscholl. He knew nothing about the developers or manufacturers and could not describe them. The main information was on a little poster: These here are housekeeping computers. Allegedly using only Soviet parts.

We received a kind invitation to an exhibit of the Tebimpex GmbH. At the designated place visitors were received by a locked door. Maybe the exhibit fee did not cover protocol.

It might also be instructive to see who did not bring what. At the nice Epson exhibit we did not see the 48 pin matrix printer. Linotype—although much of their equipment works in Hungarian presses—did not bring their new publication processing workstation Series 2000. No one offered a CD-ROM drive and especially no disks (especially no multiple read/write disks). A Japanese firm did exhibit a miraculous new video telephone, but even they were unable to get a line.

ARRAY OF PERSONAL COMPUTERS

PC, XT, AT? At every stand worth anything at all there was a minimum of three of them and sometimes even thirty. The differences were mostly in the prices, we would estimate the spread at 15-20 percent. The delivery times varied from "immediately" to 1-2 months. The OMFB [National Technical Development Committee] PC competition—which ruffled spirits last year at this time—was hardly mentioned. Because since then dollars for PC or parts import have dribbled in from other sources.

A 386? Last year it was still a sensation, this year we could compile a rather long list of Hungarian firms parading such machines—Controll, Data Manager,

Dataplan, Econorg, Microsystem, Instrument Technology, 5G, Szamszov, the SZKI [Computer Technology Research Institute and Innovation Center], Videoton. And we may have forgotten some manufacturing-assembling—or only vending—firm. There is even a 386 which copies the PS/2 with its 3.5 inch floppy disk unit and "tower mechanics" form, lacking only the microchannel.

At Videoton we could see the VT 160 AT-compatible PC and the VT 180 professional personal computer. The nicely designed VDX 526xx video terminal family fascinated the visitor. In the hobby category they came up with a more developed model of the TV-Computer. At the end of the listing is a product which hopefully is the heir apparent to a very real success—the VT-32x computer family. It appears that the VT-32 and VT-320 will be machines very useful as graphic workstations in CAD/CAM systems.

It is estimated that 20,000-22,000 PC's now work at domestic managing organizations and a quarter of these—maybe more—are connected into networks.

APPLICATIONS

The first waves of desktop publishing were beating wildly. With very great interest no fewer than ten firms exhibited DTP systems, said to be independent, but of these only four were original at least in part—the systems of Xerox, IBM, Hewlett-Packard and Supertyper.

Of the domestic ones it is worth talking primarily about the SZKI system. They had already exhibited the 1.2 version of Ventura, of Xerox origin, the first in the world to do so. Those interested could observe the program running on a Proper 132, and with a CD-ROM drive and useable disk. Those who looked around more closely could see traces of consistent development in a number of places. The Recognita character recognition system was runing on a Microtek image digitizer. At another stand they exhibited for the first time the Proscan hand image reader, which can also operate with Recognita. The reading "mouse" is obviously copied after the Handy Scanner already described in our journal but it is supplemented with a good idea—they also fitted a "real" mouse into the housing of the image reader.

IBM exhibited a system based on the PageMaker running on a PS/2 Model 30 computer, a double success. Hewlett-Packard also voted for the PageMaker, but ran it on a Vectra system, naturally with the most successful desktop laser printer, the LaserJet II.

In the fall we saw not even a trace of it but now obviously more and more believe that they can ride the pleasant waves of DTP to easy material success. There were a few who even now got a cold shower with it but others do not yet know from how many directions the wind blows in this region.

The chief actor was SZKI and its Hungarian Ventura Publisher. That is the HVP sold by them, because they have not yet got a Ventura license from Xerox for the Hungarian version. On the basis of their sole distributer rights they suceeded in signing an additional trading contract with Softinvest—but they have not gotten a similar agreement with others. Despite this they are very proud of Ventura, as of their own child. A multiplicity of publications betrays the fact that virtually every computer technician has a copy of Ventura; some have figured out the accented letters, many have redesigned the program themselves but others have not yet even discovered that every accent mark can be found in the program in addition the O and U with two dots. Still they offer DTP services based on the product.

Peter Keisz showed to those interested the Pigalle, the graphic information system of the SZKI. It can quickly record line drawings, such as signatures, with acceptable quality with the hand scanner already mentioned. It would be interesting to write a signature checking system for the scanner; the success of Recognita shows that the SZKI researchers have the know-how to do it.

Ivan Littner demonstrated a field data recorder at the SZKI stand. The device can be used well everywhere where relatively many data must be recorded at places far from one another. For example one can imagine agriculture uses where experimental—or not even experimental—parcels must be evaluated weekly or even more frequently. Supplemented with a barcode reader it might revolutionize the handling of rail shipments. If the car was supplied with a barcode consignment letter at the starting station the combined use of a barcode reader and the field data recorder would greatly accelerate the make-up of trains and even solve the continual tracking of shipments.

While the CP8 microprocessor card, especially its uses replacing cash, is spreading in France the magnetic card is just starting its victorious march here. The introduction of a waycard replacing the waybill in freight shipments has begun using the CARDIO system exhibited by the SZKI (at least Volan was mentioned to those interested as a reference site).

In addition to Softinvest more and more firms are getting into selling the dR general report generator made by the software organization work association. One can prepare reports with the software from dBASE III files on an independent PC or Novell network workstations without knowing much about computer technology. In regard to its services the dR satisfies the recommendations pertaining to the CODASYL COBOL Report Writer.

The TEXT-MARK PC software of the Applications Technology Small Cooperative can be used for manufacturing preparation in the ready-made clothing industry; it is made jointly with the USIP enterprise in Slovakia. The system is already working in a textile plant in Zilina

and it soon will be in the OKISZ [National Federation of Artisan Cooperatives] Laboratory. A ZX Spectrum is used to control the digitizing tablet. Of course one could really appreciate the efficiency of the system if it could be connected to an automatic cutting machine. But we must wait for this until we have such automatic cutting machines.

NETWORKS

One could discover primarily at the Szamalk [Computer Applications Enterprise] and KFKI [Central Physics Research Institute] stands that the world consists not only of PC's.

At the BNV, organized into a single network, were the ES-1046 of the KERSZI, the Siemens and IBM mainframes of Szamalk, a Novell PC network and a Mikrosztar 32—making it possible to demonstrate innumerable software items from a foreign trade information system through the ASKA CAD program to the Genesys expert system. Szamalk has already sold nearly 50 of the Mikrosztar 32's.

In the KFKI network, connected according to the Ethernet standard, were a TPA 11/510 supermicro and a TPA 11/520 megamini as the high powered machines with Olivetti PC's, graphic work stations and others; a TPA 170 got the role of serving station.

A new item from the KFKI was the Optomux fiber optics multiplexer which ensures good quality transmission in electrically "noisy" and industrial environments over a maximum of 8 channels at a transmission speed of 9600 baud.

At Videoton we saw the Office-Net, an office automation system connected into a local network.

So software aiding network applications does have a role. For example Microsystem is offering a new auxiliary program called MicPAS for those using a Novell network and Turbo Pascal together. The Controll Small Cooperative's LAN-streamer makes it possible for the background stores of a Novell network workstation to be accessed and used from another designated workstation, which facilitates the execution of especially fast saves. So far the Accord Small Cooperative has put into operation 80 nodes from a PC network called S-CORE, which has attracted Austrian interest as well.

In the developmental laboratories of the Instrument Technology Small Cooperative they have made a disk control card which can be used on PS/2 or PC/AT machines working as serving stations for a Novell network. The card, built on an Intel 80188 processor, substantially increases the performance capability of the network. One can connect seven subsystems to one control card, with two Winchesters per subsystem, so the maximum background storage capacity—with 80 megabyte disks—is 1.2 gigabytes. Four such cards can be connected to one central serving station, but one must also remember that the Novell software can handle a maximum of 2 gigabytes.

PERIPHERALS

Hard Drivers

On the occasion of the spring fair the officials of the Hungarian Optical Works were finally brought to "testify" in the difficult matter of floppy and hard disk drives.

Gyorgy Magyar, chief of technical development, talked about a new 14 inch, 160 megabyte hard disk store. The store can be connected to any computer with an SDM (Standard Drive Module) connector. Naturally it is the unformatted capacity which is 160 megabytes and the data therein can be accessed at an average of 27 milliseconds. They had not finalized the price, somewhere between 1.2 and 1.8 million forints is expected.

This year they are assembling the first 50 units, developed by the KFKI, at Csillaghegy. The MOM [Hungarian Optical Works] is preparing to manufacture another 50 unit zero series next year. They do not consider the development or preparation for manufacture too late because Western manufacture has stopped and according to estimates there will be demand for this device in the socialist countries for another 5 years. For example, the Soviet Union has indicated a need for 150 units.

They do not shrug off the quality objections received in regard to the floppy disk units. They stopped manufacture of the unsuccessful 40 band series and this year have started a new 30,000 unit series in half and one megabyte, 80 band, two-sided versions. The price of the smaller is 18,950 forints. For next year they promise manufacture in a series size meeting market demand of an AT compatible, 1.6 megabyte floppy drive.

The situation is harder in regard to hard disk drives for PC's. They terminated development of a normal height, 20 megabyte drive for even the domestic market is demanding at least 40 megabyte, half height devices. They have learned a lot from this, especially that manufacture of the disk and head involve real technical and even more serious investment problems. With this experience they are conducting license negotiations with Far Eastern countries. They hope to make a decision this year.

There was an entirely new, indeed unique item on display at the MOM stand, an image reader developed jointly with the SZKI. For the time being they are doing market research with the device, built on a Western parts base, and if this is successful they would like to offer it in a nicer version for about 150,000 forints. One of the few

grand prize winners is also worthy of mention; next year they are counting on selling more than 100 of the Derivatograph computer controlled thermoanalytic devices.

At the stand of the Microsystem Small Cooperative most of the visitors were doubtless attracted by the 10 megabyte exchangeable Winchester. The Winchester drive which can be connected in the place of a 5.25 inch floppy disk unit costs 295,000 forints—with one disk. The disks cost 35,000 forints each. Microsystem has a fairly large inventory of them, imported from Taiwan, and sales begin in June.

From Printer to Plotter

The Instrument Technology Small Cooperative is selling a matrix printer, put together of Japanese subassemblies, under the name M6000. The price of the six-head printer is 159,000 forints (plus AFA [general turnover tax]). Its printing speed is faster than usual in the PC category—214 lines per minute.

The Szamszov Small Cooperative showed a keyboard family coming from a West German source. The keyboard, which can be operated as an "extended screen" of the computer, is programable at four levels; LCD indicators show the current state. Fully developed it has a rather stiff price—expected to be 320,000-350,000 forints—but it saves much time, for example when using CAD programs and text editors alternately. At secretary stations addresses and telephone numbers can be programmed into individual keys, translators can define frequently appearing words on the keyboard, etc.

The Instrument Technology Small Cooperative intends to conquer the American market with a flat-bed plotter working on a new principle, in addition to its LAN connector cards. The plotter is based on an ingenious idea, now being patented in the United States. They will publish the details only after the patent is recorded.

WORM

At the Videoton stand was the first Hungarian (?), write once, read many times (WORM) optical store the content of which can be recorded by the user. This was the only table at the stand above which there was no kind of descriptive legend, not to speak of a prospectus.

Distributed Tube

We are happy to report that Tungsram showed new monitor tubes at the fair. Its display units are made with seven, nine and twelve inch monochrome picture tubes and are suitable for display of analog and digital information.

A new item is the M 17-111 distributed tube special monitor tube. One use area for it might be in vehicles where it could prove especially well in "on-board computers." Although it is not a color tube in the strict sense of the word the distributed tube does make it possible to display especially important information in a different color.

As an example they showed a monitoring system for a simulated vehicle which provides overview information about the status of the vehicle. The system was made by the TEXO Small Cooperative. They said that the Moskvich and Opel firms had shown serious interest in the monitor.

ROBOTS

At the stand of the Microelectronics Enterprise we noted that the enterprise is able to show new products after the memorable fire of two years ago. So, the MEV [Microelectronics Enterprise] is capable of renewal. We could see their surface mounting automat made on the basis of a Eurosoft Robotique license; it meets every essential requirement for manufacture of printed circuit cards and hybrid technology carrier elements. The Robomat 2000 equipment is computer controlled, its operation is automatic, it is easily converted and can be built into any manufacturing line. Its mounting speed can reach 2,000 parts per hour, staying within an error of 0.1 millimeters. It performs the necessary centering and rotating tasks without touching the parts to be mounted. Its optical unit checks the precision of the mounting.

Another new MEV product is the ICOMAT-125 LSI storage chip testing automat, a very efficient device with distributed intelligence. It can be used advantageously for functional testing of very complex semiconductor memories and for checking their DC parameters. The measurement unit is connected directly to an MSZ-1212 computer which provides the results of data processing, evaluation and correction tests and displays the static and dynamic status of the system. With it one can diagnose static, quasistatic and dynamic RAM's, ROM's, PROM's and EPROM's.

They have made real progress in the area of robotics also. Their MFR-18 small load industrial robot is suitable for reloading all parts lighter than 200 grams. The robot is made of modules performing linear and turning movements, which can be connected to one another in different ways.

Tungsram displayed equipment made of Soviet mechanics and domestic controls, about which we reported in our issue No 8, 1988. The enterprise is cooperating with the Mechatronics Technical Development Small Cooperative in Gyongyos. The latter was formed by experts who left the Gyongyos factory unit of the MEV, who now displayed their DC-IMS intelligent motor control system and an IMC Intelligent Mechatronic Control Unit. This latter could be the "soul" of manipulators, robots and automated workstations.

Finally we must also mention the products of Videoton. Robotic-mechatronic devices and welding and assembling robots won recognition at their stand.

COMMUNICATIONS

Nothing shows better the domestic success and spread of satellite television than the fact that the number of displays of devices needed to receive and distribute programs (antennas, outside and inside units) at least doubled compared to last year. There was an especially ample offering of the (inside) units needed to build community systems, but the assortment of antennas also gave a colorful picture. (All the more so because the antennas were painted different colors to suit different tastes and were supplied with graphic placards.)

A partner relationship of many years ties the BHG [Beloiannisz Communications Engineering Factory] to the West German Hirschmann Radiotechnisches Werk; the licenses for their antennas and many elements of their small and large community systems and cable television headend stations come from there. They offer a system suitable for receiving three satellite programs at prices ranging from 800,000 to 1,200,000 forints—depending on the construction circumstances. It is said in professional circles that what the BHG has gotten from the FRG was partly developed for the Germans by a Hungarian firm years ago. (The stands of the two Hungarian electronics manufacturers were virtually side by side, and their factory sites are not more than three or four trolley stops from one another.) The BHG trusts in the good name of Hirschmann and in the market success of their products.

The economic association of the CMG (Computext-Metalloglobus-Gelka) enterprises, CMGSAT, promises no less than to "bring the world into the home." They will do so for 200,000 to 800,000 forints, depending on how complete the system is. Their offering extends to individual, small community and large community systems. Their 1.8 meter parabolic antenna with stand costs 46,000 forints.

At Telekabel the price of a high gain offset antenna (without the AFA tax) is 18,000 forints. A D2-MAC individual receiver for receiving coded transmissions is 199,000 forints. A small community receiving system is 499,000 forints. And a large community system can be obtained for 999,000 forints. With the many nines they are following the Western style in setting prices, and they hope to adjust the parameters to the norms there as well.

Although many have complained to Telekabel because of delay in installing systems the BBC—which is seeking partners for their tranmissions to Hungary—is very satisfied with them. As Hugh Closs said, they were prepared to have to rent an antenna set up for Eutelsat for the time of the fair, for a good bit of hard currency. This did not happen; Telekabel provided everything necessary, free of charge. The Hungarian interest in BBC amazed the English who, after a number of countries in Europe, would like to propagate their programs on cable networks in Hungary—perhaps the first among the socialist countries.

There were four antenna sizes in the offering of the Parabola Cooperative. Depending on construction the price of their systems varies between wide limits. The price of their 1.8 meter antenna, complete, is 35,500 forints but one must pay about 550,000 forints for their three-channel large community system.

The outside unit and polarity changer for most domestic systems are obtained from abroad. The Telecommunications Research Institute (TKI) itself makes not only the antenna but also the antenna head. Is it worth it? It is hard to say, opinions were divided even among the firm's exhibitors. Not to speak of the other satellite people according to whom the too "bulky" polarity changer of the TKI is only an experimental model which is far from series manufacture. If it is true that the necessary low noise amplifier circuits cost almost as much as a fully assembled outside unit then the future of the research achievements of the TKI is really questionable.

The cable television headend station of the Communications Engineering Cooperative won the Fair Grand Prize. We should not wonder at it for the HTSZ [Communications Engineering Cooperative] has developed television products at a truly professional level, including elements of the cable systems. Seeing their products, prepared with precision technology and competitive with Western products, we must evaluate the other domestic satellite reception systems as amateur work.

The HTSZ is also a step ahead of the others in that it has already shown its cable television units suitable for two-way information transmission. These are considered novelties even in Western Europe. In the United States, where the transmission capacity can never be enough, one can only build two-way cable networks now. In our country the supply of telephones is a good bit worse than the European average so any cable network suitable for two-way transmission could be very important to ease the telephone problems. It makes no difference to the cable what is flowing over it; if it is data then we call it a data transmission network, which is a step toward integrated informatics services.

It is at least 5 years late compared to the ideal time but at last we can see a Hungarian language teletext charactor generator which handles all the accented letters appearing in the Hungarian language. This is the Philips SAA 5243 "world decoder" circuit, its full name is the ECCT (Enhanced Computer Controlled Teletext) circuit, which meets the requirments of all European languages using the Latin alphabet and is suitable for storing four full pages at a time. If the domestic television

factories build these circuits into their sets then we will not have orthographic errors in the new equipment—presuming that the editors do their work well too.

Philips has also taken a big step forward in the area of developing the circuits necessary for receiving satellite transmissions; they have made a multi-standard MAC decoder. So the transmission can be C, D or D2-MAC, it makes no difference, their circuit can form any of them into a baseband video signal. They have also developed tuning and demodulator integrated circuits making up a part of the inside unit of a satellite receiving system.

Videoton wants to get into a new activity, communications electronics, in addition to entertainment and business electronics. It is a new factor here that, cooperating with the OMFB [National Technical Development Committee], the Electronics Institute of the BME [Budapest Technical University] and the BHG, they would like to realize a cell radiotelephone system. The greatest advantage of this is that it is portable; so it can be used at home, in the car or at a weekend house. Long-distance calls can also be made with radiotelephones.

SOCIALIST EXHIBITORS

Not many Polish exhibitors came to Budapest with computer technology merchandise. Three firms figure in the Hungexpo preliminary information; the best known of these, Elwro, brought computers compatible with IBM PC/XT and AT, a CAD/CAM system it developed itself and other applications programs.

The Gdansk Ship Manufacturing Information Enterprise (ZIPO), which did not appear on the fair lists, did come to Kobanya for the first time. Surprisingly a giant placard at their stand announced the computer aided engineering systems of the United Kingdom PAFEC firm, and they showed the CAD system of the English on the IBM PC exhibited. The reason is that two months ago they purchased the right to sell the PAFEC program. So far the system has not gone into industrial use in Poland, but ZIPO has faith in its collective of about 100 people, with many years of computer technology experience.

The Polish state enterprise had specialized earlier only for ship manufacturing tasks but today it works in every area of the economy. They will undertake to deliver IBM XT, AT and 386 computers and peripherals (printers, etc.) using imported parts and printed circuit boards in their consignment warehouse or to build a complete configuration and they develop and adapt software (among other things they brought to Budapest a number of agricultural programs). Thanks to their extensive international contacts they are able to satisfy demands flexibly, their representative said. They have not yet done business with Hungary, but they would like to change this through their participation at the fair.

We could see an SZM-52/12 from Czechoslovakia, a VAX compatible minicomputer. We found the most disgusting exhibitors around it. When we asked if this was their new VAX compatible computer they quickly sneaked away after a curt "yes." This was all the enlightenment we could get.

In addition to a CAD/CAM system the Soviet Union exhibited three PC's. They use the DVK-3 as an intelligent terminal; its speed is 800,000 operations per second. The DVK-4 has a similar speed, but it is a 16 bit machine with a maximum operating memory capacity of 248 kilobytes. And finally we could see a modern machine compatible with the PC/XT, with 512-1536 kilobytes of operating memory, which is still manufactured only in small series.

8984

FACTORY AUTOMATION, ROBOTICS

GDR's IRB 95 Robot Applied in High-Precision Assembly

23020019 East Berlin FEINGERAETETECHNIK in German No 6, 1988, pp 248-251

[Article by Graduate Engineer F. Finke and Engineer K. Bomboes, Koepenick Radio Works, VEB, Center for Communications Electronics Research and Technology: "Automated Assembly of a High-Precision Module With the Aid of the Industrial Robot IRB 95"]

[Text]In the automating of assembly processes, problems frequently arise that are due to dimensional-functional, tolerance-related, and production-engineering factors of the technological project.

This is all the more distinctively the case the later the automating measures are begun, because in that case it is no longer possible as a rule to carry out any substantial modifications on the structural units that would be desirable from an assembly-technology viewpoint.

In the following remarks some selected peripheral mechanisms for an automatic assembly machine are presented that allow one to assemble completely automatically an electromagnetic module—which is not inherently adapted to automation—of the teletypewriter F 2000 (Zwoenitz Measuring Instrument Works VEB).

1. Technological Task

Three separate parts, sleeve 1, steel bushing 2, and plastic bushing 3 as well as a subassembly, coil 4, are to be fitted together in the axial direction upon a joining spindle 5 and subsequently bound to one another inseparably through staking (Figures 1 and 2). Because of high coaxiality requirements, the joining spindle must not be removed until after the staking, because only in this way is it ensured that the parts are permanently fixed in the right positions with respect to one another.

In implementing a completely automated joining process, the following problems were to be solved, among others (Figure 2):

- The inner bore of the sleeve (diameter 3.3^{F8}) is to sit on the joining spindle without binding but with the smallest possible play. Sleeves with a bore hole not the exact size (too small) or with burr or shaving residues must be identified and discarded before assembly (P1).
- The coil wires must be accommodated in the slot of the sleeve in a positionally correct way and without damage to the insulation; their freely hanging ends, 220 mm long, must not interfere with the functioning of any equipment or handling mechanisms (P2).
- Depending on the tolerance situation, the plastic bushing (mass about 30 mg) is to be joined to the steel bushing with 0.04 mm of play or with 0.01 mm of allowance; in this process the wall, which is only 0.13 to 0.16 mm thick, must not by any means be deformed or damaged. For reasons of proper magnetic functioning the inner bore hole of the steel bushing is only provided with an inadequate jointing aid (0.16-mm chamfer) (P3).
- The staking is to be done by means of three points staggered by 120 degrees. Preliminary technological tests showed that for an adequate fixing of the steel bushing in the sleeve, staking forces of up to 2,800 N per point are necessary, and that in this staking the deformation of the steel bushing must be limited by a suitable counteracting structure (anvil). The joining spindle must not be subjected to bending stresses in the radial direction because of any resulting force components (P4).

These partially very special demands cannot be satisfied straightaway by an automatic machine configured out of subassemblies functioning as modular units, but instead require a considerable additional use of peripheral mechanics, sensing systems, and control.

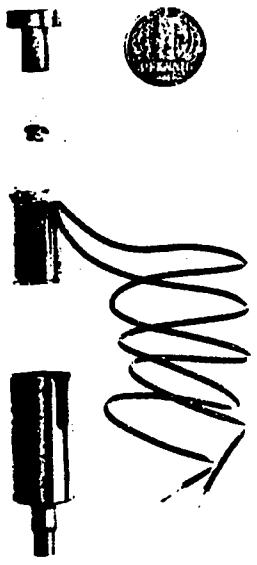


Figure 1. Picture of the Parts To Be Joined

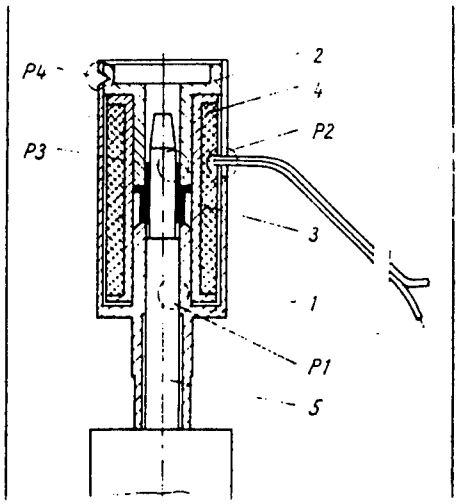


Figure 2. Assembled Module on the Joining Spindle
(1=Sleeve; 2=Steel bushing; 3=Plastic bushing; 4=Coil subassembly; 5=Joining spindle; P1-P4=Explanation in the text)

2. Description of the Automatic Machine

An automatic machine going by the designation "MAH"—using enterprise Zwoenitz Measuring Instrument Works VEB, Karl-Marx-Stadt Instrument Works division—has been developed which despite its single-purpose character has a largely modular construction.

Its functional structure is illustrated in Figure 3 and its geometric arrangement (layout) is shown in Figure 4.

The manipulator used was a three-axis configuration with a two-jaw parallel gripper from the freely-programmable industrial robot modular-design system IRB 95, whose control system is based on K-1520 technology. The IRB 95, which is presented in detail in [1], involves translation modules ("axes") that can be combined in terms of Cartesian translations, which if required can be expanded by means of a base turning unit (not needed for the automatic machine described here). The axes can position with a reproducibility of less than or equal to plus/minus 0.1 mm and are able to exert considerable joining forces (more than 50 N). Furthermore an additional control feature allows a "monitored axis movement," which will be considered in more detail later.

Moreover the use of a freely programmable manipulator proved to be advantageous especially in the initial start-up and during the testing, because modifications in the sequence of technological operations or optimizations of

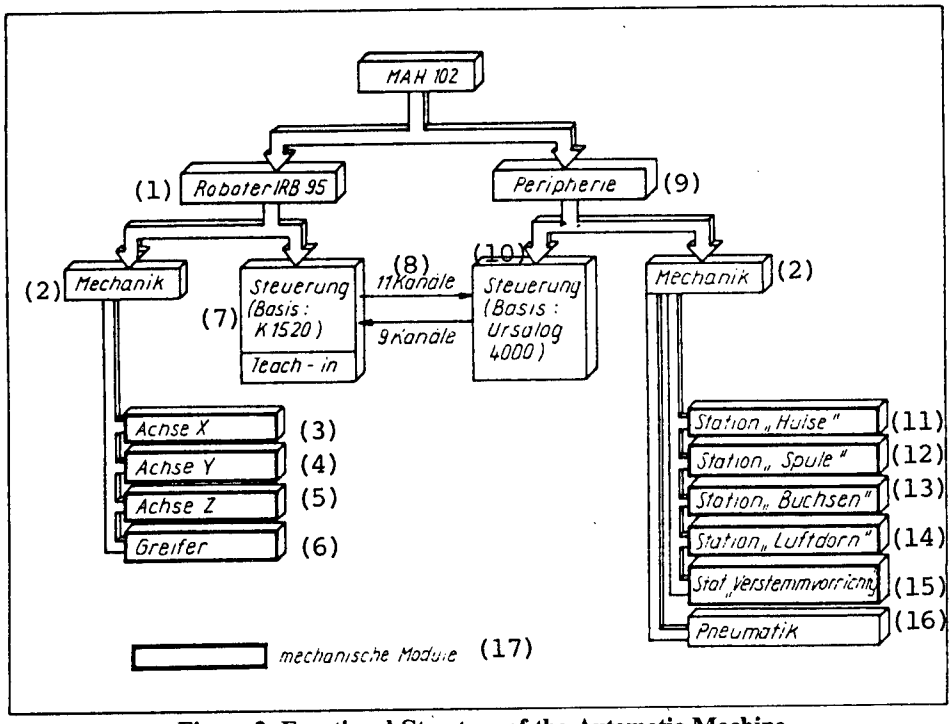


Figure 3. Functional Structure of the Automatic Machine

Key:—1.Robot IRB 95—2.Mechanics—3.Axis X—4.Axis Y—5.Axis Z—6.Gripper—7.Control (basis: K 1520)—8.11 channels; 9 channels—9.Peripherals—10.Control (basis: Ursalog 4000)—11.Station "sleeve"—12.Station "coil"—13.Station "bushing"—14.Station "air spindle"—15.Station "staking device"—16.Pneumatics—17.Mechanical modules

the handling and joining process could be incorporated without difficulty. Thus the slide travel in connection with transporting the coil was experimentally optimized.

All the mechanical drives, except for the three robot axes equipped with GMP-52 motors, exert their effects by means of pneumatic working cylinders.

For the peripheral mechanics, the modular grouping principle was likewise implemented as consistently as possible. With the exception of the station "air spindle," which is fastened to the gripper and is trued by it, each station forms a unit mounted separately on a base plate, whose repeatably establishable positioning on the machine table is ensured by means of stops. All electrical and pneumatic connections to a station are designed as plug-in units, so that for maintenance, repairing, and testing purposes each station can be removed separately from the table and if needed can even be operated outside the automatic machine with the aid of suitable adapters. The peripheral stations have the task of making available in the right orientation and at definite withdrawal locations the components to be joined, to provide for the orderly sequence of assembling, and to bring about an interruption of automatic operation in case of irregularities.

Whereas the individual parts sleeve 1 (see Figure 2), steel bushing 2, and plastic bushing 3 are picked out from randomly piled bulk material at their stations, the subassembly coil 4 must be stored in a magazine (50 pieces in each magazine) before delivery to the "coil" station.

The peripheral outputs (12 pneumatic valves, 4 vibrating conveyors) are controlled by ursalog-4000 modules, which are wired to each other in wrap-round fashion in accordance with five phase diagrams (programmed for each station according to its own flow chart).

The peripherals control corresponds with the robot control via 20 channels, and the sensing processes of the mechanical peripherals are recorded via 22 inputs.

The automatic operation is started by the robot, which is superordinate to the peripherals, only when the automatic machine is in a definite basic state (robot modules in the "synchronized" initial position, all stations in readiness, safety regime in effect).

This condition is ensured by various electrical and control-logic interlocking mechanisms.

The automatic regime is the normal mode of operation of the MAH 102. If desired, it can be switched over to manual operation for testing and adjustment purposes.

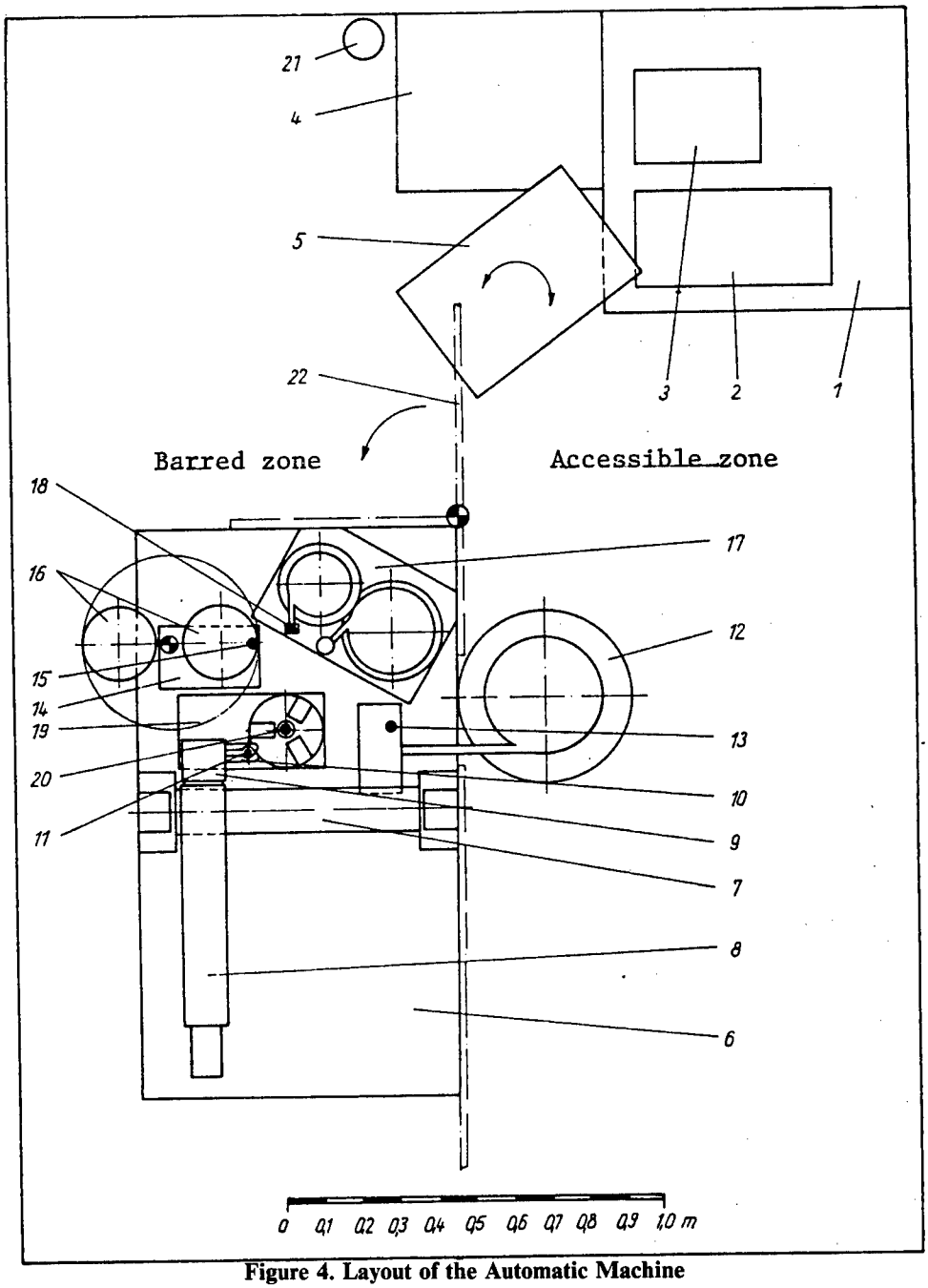


Figure 4. Layout of the Automatic Machine

Key:—1=Control console—2=Robot keyboard—3=Peripherals keyboard—4=Control cabinet—5=Teach-in module (pivotable)—6=Machine table—7, 8, 9=x, y, z axes of the IRB 95—10=Gripper—11=Air spindle—12=Station "sleeve"—13 =Sleeve removal location—14=Station "coil"—15=Coil removal location—16=Magazine platforms—17=Station "bushings"—18=Joining anvil—19=Staking device—20=Joining spindle—21=Signal light—22=Barrier with door

3. Description of Certain Mechanical Details

The two first-mentioned problems in Section 1. are solved in the following way at the station "staking device": The joining spindle (Figure 5) is seated in an axially movable way in the center of the staking device and is upwardly spring-stressed against a stop. This stop, which is connected to the piston rod of a pneumatic working cylinder, can assume two positions: The normal lower working position and an upper position, in which

if needed (removal of the sleeve by hand) it serves as an ejector.

The spring force F_F directed upward is used several ways in the course of an assembly cycle, in conjunction with an optical sensor that emits a signal at a defined partial stroke s_{trip}:

- In laying sleeve 1 on top of the joining spindle, the vertical robot axis covers the entire joining stroke of 35 mm between two target positions in a "monitored axis travel." If during this travel the sensor trips, the control unit interrupts the joining process and proceeds according to a subroutine, where the robot ejects the sleeve as a reject and begins a new cycle. Thereby it is ensured that with all sleeves used the joining force for the diameter of fit of 3.3 is less than F_F.

- In fitting the coil into the sleeve, the positioning accuracy of the robot, the condition of the coil as compared to its proper design, and the orderly introduction of the coil wires in the sleeve slot are controlled in the same way:

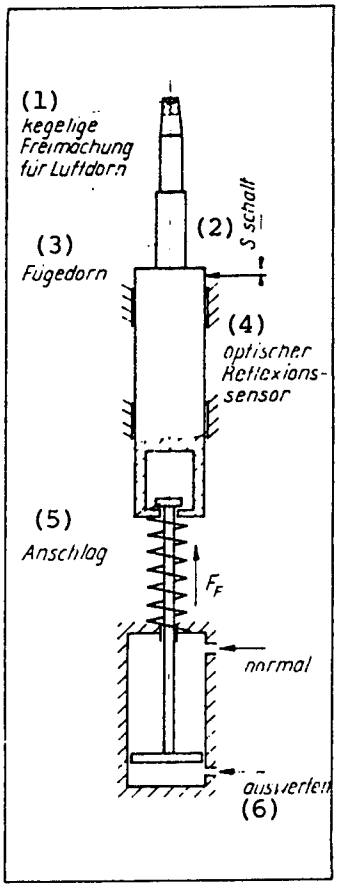


Figure 5. Functional Principle of Joining Spindle
Key:—1.Tapered accommodation hole for air spindle—2.S_{trip}—3.Joining spindle—4.Optical reflection sensor—5.Stop—6.Eject

If during this fitting process (distance between target positions: 20 mm) the spring-loaded spindle triggers the sensor because of parts colliding with one another, the movement of the axis is stopped and automatic operation is interrupted, so that the operator can determine and eliminate the cause of the collision.

- After all four parts are joined a so-called anvil rigidly attached to the gripper travels into the accommodation hole of the steel bushing 2 and in moving down further presses out against the spring force the axial air due to tolerances between parts. Here, when there is an exceeding of s_{trip} the sensor functions as an indicator that an axial joining force (greater than F_F) arising in accordance with a spring characteristic is operative.

For the complicated handling of the plastic bushing (third problem described under Section 1.) a special peripheral station was installed on the vertical robot axis, the so-called air spindle (Figure 6).

Its principle of functioning will be explained on the basis of Figure 7: The axially movable air spindle aligned vertically exactly in the center of the gripper is found to be either in an upper or a lower position when actuated by a pneumatic working cylinder.

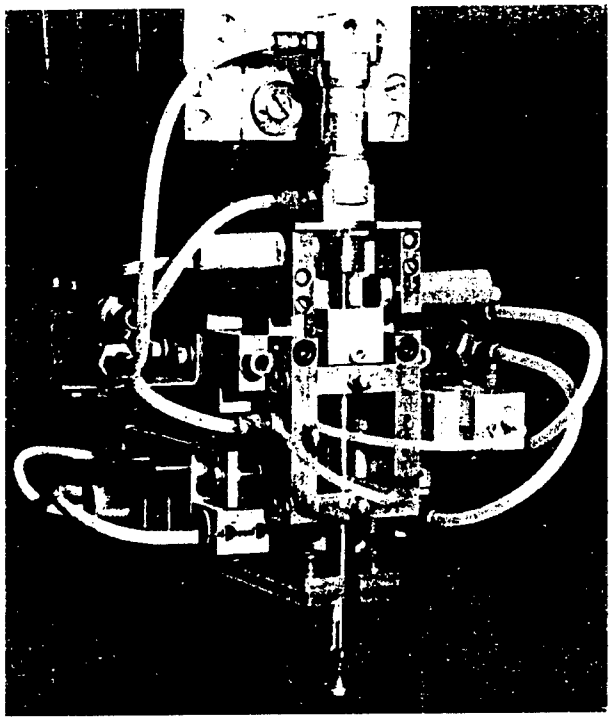


Figure 6. Two-jaw Parallel Gripper With Station "Air Spindle"

From the lower or working position it can be displaced upward against a spring force (also with the gripper closed). Into a central hole that ends within the lower spindle region in outlet openings directed obliquely upward, air is blown in accordance with the program sequence, the pressure of which is monitored by a P/E transducer.

Later on in the technological assembly cycle (sleeve and coil are already on the joining spindle in the staking device) the vertical robot axis plunges the air spindle—which with the gripper closed is located in the lower sensor-monitored position—down to a definite depth in the internal bore hole of the steel bushing. After the opening gripper has gripped the steel bushing, the robot draws by means of the air spindle tip the plastic bushing out of the feed rail of the vibrating feeder in a horizontal y-direction over the hole of a joining anvil. Both in immersion into the steel bushing and also into the plastic bushing, the sensor "spindle down" checks that the axial force does not exceed the spring force F_L.

In the following downward travel of the vertical robot axis the plastic bushing, which is centered on the steel bushing by the offset air spindle, is fitted into the steel bushing. The orderly progress of this joining process (and also the subsequent transporting to the staking device and the transfer of both bushings to the joining spindle) is monitored by the sensor "spindle plugged." If this P/E transducer does not actuate because the air can escape from the spindle openings, the robot pauses and calls the operating personnel.

The tip of the air spindle is designed in such a way that it fits into a corresponding tapered accommodation hole of the joining spindle (see Figure 5). When the robot with the bushings is located over the center of the staking device, again the vertical "monitored axis travel" is activated—that is, with the spring-loading of the joining spindle the programmed downward movement is to be interrupted.

The joining process takes place in the following phases: First the two spindles "couple," and then with further downward movement, because F_L is less than F_F, the joining spindle presses the air spindle upwards (controlled by the sensor "spindle down" that trips upon a negated signal), so that the bushings slide over onto the joining spindle and the sensor "spindle plugged" signals the delivery of the plastic bushing. Now the gripper closes. The air spindle is drawn upwards by its pneumatic working cylinder and the continuously "monitored" downward-traveling axis presses with the closed gripper jaws the steel bushing into its sleeve fitting.

Then, as already mentioned, with the anvil rigidly mounted on the gripper the axial play is pressed out against the spring force F_F and the staking is initiated.

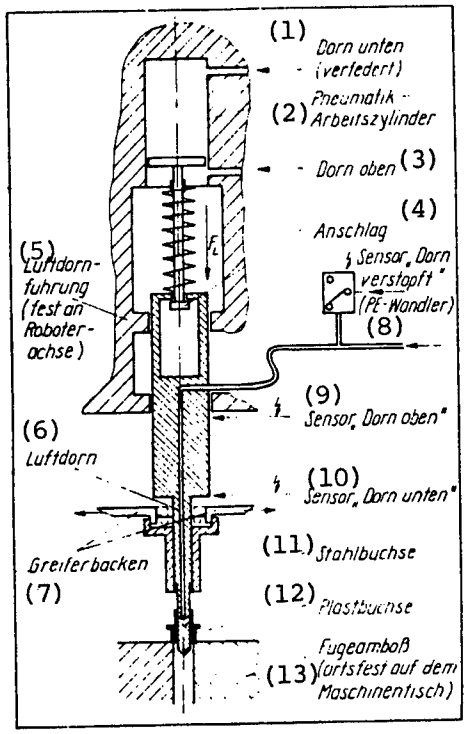


Figure 7. Functioning Principle of the Air Spindle

Key:—1. Spindle down (spring-stressed—2. Pneumatic working cylinder—3. Spindle up—4. Stop—5. Air spindle guide (fixed on the robot axis)—6. Air spindle—7. Gripper jaws—8. Sensor "spindle plugged" (P/E transducer)—9. Sensor "spindle up"—10. Sensor "spindle down"—11. Steel bushing—12. Plastic bushing—13.Joining anvil (rigidly mounted on the machine table)

The staking work is performed by a pneumatic working cylinder whose force, if needed, can be varied manually by means of a pressure regulator. This force is transmitted via a cam-gear mechanism and distributed to the three staking points, which are designed to be adjustable and are set in such a way that the lines of action of the staking forces meet at the cross-sectional midpoint of the sleeve, so that no components of the considerable forces (up to 2,800 N per point) act on equipment parts (for example as a bending force on the joining spindle). After the staking, the robot draws out the module from the joining spindle, takes it to the storage rack, advances a counter, and begins a new assembly cycle.

Bibliography

[1] Robel, G., Thiel, M., "Industrieroboterbaukasten IRB 95" [Industrial Robot Modular Design IRB 95], INT-MITTEILUNG, Berlin 4 (1986), pp 44-48

12114

Automation of Hungarian Manufacturing Systems

25020053a Budapest MAGYAR ELEKTRONIKA in Hungarian No 3, 1988 pp 9, 18

[Article by Miklos Hajnal: "Automation of Manufacturing Systems"]

[Excerpts] The automation of compartmented technologies and within this the use of robots are increasingly becoming one of the key questions of industrial development. This article deals with a few fundamental questions of the automation of manufacturing systems, devoting special attention to the man-machine link, and then describing the most recent domestic possibilities for system design and realization.

FLEXYS

In order to encourage manufacturing automation the Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences, the State Development Bank (or its legal successor the Budapest Bank Joint Stock Company), and the TRANSMERX GmbH subsidary of the Osterreichische Landerbank decided to found a joint stock company dealing with computerized manufacturing automation under the name of the FLEXYS Joint Stock Company. Its spheres of activity are:

- Automation of production processes, and within this
  —computer aided technological and designing systems;
  —computer controlled manufacturing cells and systems; and
  —shop level production control systems;

- Design and implementation of plant and enterprise production and management information systems and local networks;
- Development and operation of a reference system;
- Trading in the components, hardware and software elements and related know-how constituting the above systems; and
- Technical services aimed at spreading the results of research and development.

The activities of the company embrace the entire CIM [Computer Integrated Manufacturing] sphere and within this are primarily aimed at developing CAD and CAM systems and partly at developing CAST [Computer Aided Storage and Transport] systems.

CAD/CAM/CAST Basic Systems

Present and future domestic needs will involve the following systems:

1. Flexible Manufacturing Cells One or two NC machine tools (lathes, machining centers) served by robots or manipulators. Automatic tool and workpiece exchange. Computerized scheduling of the parts program and supplies of tools, devices and workpieces. Dispatcher functions. Computerized supervision. Possibility of connecting into a system.

2. Small and Medium Manufacturing Systems Operating 2-4 NC machine tools (lathes, machining centers) with automatic tool and workpiece flow (transport, exchange). Stockpiling and control (record keeping) of tool, device and workpiece supplies, partly or completely automated, by computer. Computer aid for basic testing and monitoring functions. Operation with little supervision.

3. Design and Technological Planning Systems Planning the geometric design of parts and workpieces. Preparation of operation plans and operational sequences. Defining technological parameters and parts programs (the NC program). Preparing and recording documentation and preparing bids.

4. Systems which Combine the Systems in Points 2 and 3, i.e. small and medium integrated material processing and data processing systems

5. Complex, Computer Controlled Manufacturing Systems Automatic control of 4-10 NC machine tools or machining centers. Traditional machine tools can be included in the system via computerized shop level production control. The computerized designing and technological planning system produce the technical database necessary for control of the manufacturing system. High level monitoring and diagnostics. Operating with little supervision, without periodic supervision.

6. Computerized Plant Control Systems for Plants With Traditional Technology Fine programming of manufacturing, stockpile records and warehouse control, tracking the flow of materials and products, manufacturing monitoring, terminals and data entry installed in the plant, possibly via direct machine connections.

7. Electronified Shop Level Information Systems, combining the systems in points 3 and 6.

Work Methods

The activity of the company relies on a research and development base; cooperating with planning and manufacturing institutions, it extends to the following in realizing the above systems:

- **Discovering and analyzing user needs** and designing the needed systems making maximal use of existing intellectual and material products.
- **Performing adaptation developments** and specifying new developmental (possibly research) tasks.
- **Configuring electronic systems** to solve the control and informatics tasks, planning their installation and serving as planning chief.

- **Specifying or designing the basic and user software** needed to operate the systems and further developing it as necessary.
- **Preparing for the industrial application of R&D results**, supporting this with professional consulting, organizing cooperation and participation at the prime contracting level in implementations.
- **Promoting and marketing know-how and program products.**
- **Organizing user training** and preparing documentation for this.

For the effective operation of the company it is absolutely necessary that it maintain direct responsibility for all the parts of the entire innovation process in accordance with its activity, namely:

—system design,

—technical design,

—selection, acquisition and application of hardware,

—its own software development,

—selection, acquisition and application of purchased software,

—putting the systems into operation,

—marketing.

Autobiographic Note

Miklos Hajnal: I obtained a diploma in instrument and control technology at the Electrical Engineering School of the Budapest Technical University in 1967. From then until 1986 I worked in the process control faculty of the Budapest Technical University. In the beginning I dealt with identification, then beginning in 1972 I tried to get useable results in a few areas of artificial intelligence research (pattern recognition, learning systems, fuzzy theory, image processing). Parallel with this I also dealt with some practical problems of programmable process control systems (measurement data collection, electric noise problems, PLC's). I won an Academy prize in 1975 and then participated in a 3 month study tour at the Helsinki Institute of Technology. I earned a university doctorate in 1980 in the area of texture studies. Since 1981 I have been dealing more and more intensively with intelligent robots. I have also lectured on this subject and continuing the theme of my earlier lectures on pattern recognition. After 1986 I worked in the robot and pattern recognition department of the machine industry automation division of the MTA SZTAKI [Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences] and since 1987 I have worked on robot applications as a supervisor for the FLEXYS Manufacturing Automation Rt [Joint Stock Company].

8984

MICROELECTRONICS

Hungary, Yugoslavia To Collaborate in Microelectronics

25020061 Budapest
COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 11, 1 Jun 88 p 4

[Article by Janos Kis: "Reassuring Cooperation"]

[Text] A cooperation contract was signed recently by the Hungarian MEV [Microelectronics Enterprise] and the Yugoslav Generalexport, having as its goal the mutual development and manufacture of microelectronic parts, especially in the area of manufacture and development of CMOS microprocessors. The link between the MEV and the Nisi Ei enterprise expands and gives contractual form to cooperation, which has been very successful even earlier.

Since 1973 Tungsram—with the mediation of the MEV—has been delivering diodes, transistors and IC's to the Yugoslav partner in zero-balance deals, to a value of about $26 million per year. At the beginning of the cooperation our country received primarily discrete silicon and germanium semiconductors. A substantial qualitative leap occurred in 1977, when an IC manufacturing-testing division was put into operation at Tungsram. Then began the series manufacture in Hungary of the analog integrated circuits for consumer electronics (radio and television) and of some digital IC's. There was great demand for these by the Yugoslav partner, and in exchange we got zener diodes and switching and power transistors, which replace capitalist import.

In the meantime, they reduced the agreed-upon accounting prices. But the delivery value was maintained by increasing the volume. It increased the confidence, that the Yugoslav and Hungarian partners used each other's trade marks on their products. We could achieve an investment saving of more than $3.5 million through better exploitation of each other's manufacturing capacity. The well-working cooperation also helped moderate the harm caused in domestic parts supply by the memorable fire at the MEV.

The present agreement expanded the joint work with new possibilities. Both sides can use the patents jointly created within the framework of research and development. Manufacture of surface mounted semiconductor devices, CMOS integrated circuits, integrated circuit capsules and sensors used in auto electtronics, automatic and control technology elements, sensors, robots and automatic measurement devices are all areas where working together can lead to results. In addition, an opportunity is opening up for joint design of the masks for some circuits, for delivery of chemicals, and for the joint development and manufacture of very reliable semiconductors, the "elites" of this technology.

The MEV-Ei link is being expanded by bringing in other firms. Promising talks are under way for bringing in Orion to eliminate the color picture tube supply problems of domestic television manufacture, problems caused by the uneven Polish deliveries. The MEV will pay for deliveries by the Yugoslave enterprise—if an agreement is reached—with semiconductor devices.

The technical experience and expertise of both sides supplement one another; the Hungarian enterprises have manufacturing experience in the area of bipolar semiconductors while Ei has such experience in MOS technology. So far they have jointly produced 1.5 billion diodes and transistors and 300 million bipolar integrated circuits. Between 1983 and 1987, Hungary delivered 15 million integrated circuits and 40 million transistors while the Yugoslave partner delivered nearly 100 million zener diodes and 50 million transistors. These traditional elements are now being expanded with the elements of CMOS technology. The semiconductor devices, exchangeable with world market parts, can significantly contribute to improving the foreign exchange balances of both sides.

8984

Hungarian Videoton's Graphics Workstation

25020039d Budapest MAGYAR ELEKTRONIKA in Hungarian No 1, 1988 pp 30-33

[Article by Viktor Heiczman and Zoltan Hidvegi: "Videoton's Graphics Workstation"]

[Text] In order to support the development of CAD-/CAM applications, we developed at Videoton, the VT32 G graphics workstation, based on a VT32 base computer. The most important characteristics of the base computer remained—modular construction based on a VME bus and a UNIX compatible operating system.

In this article we will describe the main unit of the workstation, the graphics subsystem and the structure of the graphics software based on it. By the graphics software of the workstation, we mean a software system offering a number of services extending from the subroutine package realizing low-level graphics functions to the general purpose, interactive geometric editors. This graphics software can be conceived of as a basic service for CAD/CAM applications which can be made complete with one's own development. We will say here only a few words about special applications built on this tool base, most of which are in the developmental phase.

Structure of the Hardware

Basically the graphics subsystem consists of two cards connected to the VME bus:

—graphics control (GRP), and
—graphics memory (GRM).

A PixMan (Pixel Manager) control microprogram supports high-level graphics operations. At present a maximum of four graphics subsystems can be connected to one computer.

Characteristics of the GRP
—Manages a high resolution color monitor; resolution can be programmed. The standard image resolutions are 1024 x 768, 768 x 576 and 640 x 480.
—16, 256 or 4096 colors can be selected (depending on configuration) from a palette containing 4096 colors.
—Vector drawing speed is a maximum of 1 microsecond per pixel.
—Speed of filling an area with color or with a sample is 65 nanoseconds per pixel.
—High speed area copying within image memory is 65 nanoseconds per pixel.
—High speed image filtering within image memory is 65 nanoseconds per pixel.
—Handling the alphanumeric keyboard and positioning device (mouse or tablet) is through a V24 interface.
—Laser printer control.
—Video-look-up expandability.
—512 K byte memory area above the VME bus to load programs or graphic commands.

Characteristics of the GRM
—Expandable image memory; capacity of one unit is 1K x 4K x 4 bits (that is, 2 M bytes); a maximum of four graphics memories can be used on one control card.

Chief Functions of the PixMan
—Setting the plotting environment; viewport; cutting area; line, marker, text and area filling characteristics.
—Basic plotting routines for drawing line, polygon, ellipse or elliptical arc.
—Text handling with various character types.
—Loadable character generators.
—Area filling, spot filling, ellipse and elliptical section filling.
—Operations with blocks, curves, spots, points and point series.
—Cursor management.
—Area copying, raster operations.
—Zoom function (independent horizontal and vertical magnification).
—Dynamic memory management.
—Handling input devices (keyboard, mouse, tablet).

Graphic Software System of the Work Station

We intended the graphic software system as a uniform and effective tool for development or acceptance of CAD/CAM applications. We should mention as a general characteristic that when designing the software system another important viewpoint was accomodation to standards or de facto standards.

We wanted to achieve a double goal with this:
—On the one hand accomodation to present standards can with greater probability aid the take-over of applications already developed on a different computer;

—On the other hand the graphic standards of the near future (GKS-3D, PHIGS) take existing standards into consideration when possible so we will have somewhat facilitated expansion of the software system.

The modules described here form an unambiguous hierarchy (see Figure 1) [it should be noted that the figures in the original are reversed; references to Figure 1 are really to Figure 2 and vice versa]; at the same time each can be accessed directly for applications as well. In this way we help the applications to select the graphic interface according to the set of functions to be used. In order to use a single tool an appropriate CGI realization is the surface of choice; for uniform management of several tools the GKS is most convenient; and for generating complete geometric models we recommend the interactive editors.

CGI, Computer Graphics Interface

The surface for the graphic tools which can be connected to the workstation which can be used by applications or by higher level standards was realized on the basis of the CGI standards proposal (CGI Second Initial Draft, ISO TC97/SC21/WG2 N356). The CGI provides a functional and syntactical prescription for possible classes of graphic peripherals (OUTPUT, INPUT, OUTIN) and for the two-dimensional operations which can be executed.

We were able to develop the broadest function set for the graphics subsystem; this makes possible access of virtually the entire service set of the subsystem and at the same time covers the operation needs (two-dimensional) of higher level standards.

The CGI Interface of the Graphics Subsystem

The low level operations essentially coincide with the corresponding functions of the PixMan. The most important higher level expansion is the realization of segment handling, which is an indispensable service for all interactive graphics software.

In the interest of efficiency the functional part of the CGI is loaded into the 512 K byte dual access memory of the GRP and runs on the GRP; only a minimal subroutine interface burdens the main processor. The peripheral handling of the graphics subsystem monitors communication between the two parts, based on data records.

The CGI Interface Realized on the Plotter

The CGI realized on the plotter contains the entire output set of the CGI interface of the graphics subsystem, including segment handling. Naturally the call syntax for the individual functions precisely coincides with the syntax belonging to the corresponding function of the graphics subsystem. At present an appropriate CGI device drive supports the Videoton NE3000 plotter or HPGL command language plotters.

Language Interfaces

The method for realizing the language interfaces is based on the ability of the language system to call C language functions from programs written in both FORTRAN 77 and PASCAL. The CGI implementations were prepared in the C language, so the obvious solution was to write the other language interfaces through the C interface (Figure 1). At present the FORTRAN interfaces belonging to the various peripherals can be used [word apparently omitted in original] (outside the C interfaces).

GKS, Graphical Kernel System

Graphics applications and the great majority of CAD/CAM applications use many graphics devices, generally at least a graphics display and a plotter. Realizing a GKS, adopted as an ISO standard, helps in the use of several graphics devices; it is device-independent and makes it possible, in a largely portable way, to access the standard services offered by the devices and to a limited degree it also supports the utilization of special capabilities.

The structure of the GKS implementation can be seen in Figure 1: The CGI interfaces provide the device-dependent part while the device-independent GKS layer is built above them. The GKS implementation is at the 2b level; that is, it embraces the entire output set defined in the standard, device-independent segment storage and almost the entire service set for graphic input possibilties—the SEGMENT PICK function only with inititiated (REQUEST) input.

General Purpose Graphic Editor-Display Programs

It is a common property of the graphics services mentioned thus far that one can access the several functions as subroutines. But as CAD applictions developed those tools which provided the user with the convenient (interactive graphics) generation of complete geometric models took on an ever more significant role. Supplemented by libraries and by interfaces prepared for various applications these appeared first in the graphic input subsystems of some applications and later as an independent interactive editor-display system.

Naturally, for these systems also, the contradiction between generality and efficiency, which can be called a general one in computer engineering, constantly arises. Our solution is that in both systems (two-dimensional and three-dimensional) we try to cover the broadest possible set of basic elements and the operations which can be performed with them, but at the same time we offer a number of model describing interfaces for systems with similar functions or to load the geometric part of the databases of special CAD/CAM applications. Of

these the most significant is the metafile interface generated on the basis of the IGES (Initial Graphics Exchange Specification) adopted as an ANSI standard.

VIDRA (VIdeoton DRAfting system) 2D

The VIDRA 2D is a general purpose, two-dimensional graphics editing program. In addition to its basic graphics functions it has capabilities which support the planning and preparation of technical drawings. Figure 2 [actually Figure 1] shows the appearance of a screen when producing such a drawing.

The system is suitable for:

—drawing, erasing, copying and transforming simple plane figures—sections, blocks, circles (arcs) and ellipses (arcs);

—basic editing (parallel shifting, drawing out touching or perpendicular sections and arcs at designated points, rounding the corners of rectangular figures, etc.);

—filling polygons (with color and with a sample which can be set);

—providing the figure with text with several fonts and intervals, in any direction or size;

—using independent line and character colors (four each user colors) the tone of which can be set optionally (i.e., limited only by the hardware);

—dimensioning the drawing elements;

—segmented handling of the drawing (on a total of 16 "foils");

—magnification and reduction of areas (independently on the several foils, storing for a maximum of eight magnification steps);

—erasing and shifting areas and copying accompanied by transformation (axial reflection, etc.);

—use of symbols (definition, copying, modification, archiving and performing the simplest database management functions with them, such as erase from library, rename, modifying type or data address);

—file management functions (saving a drawing file to an optional name, inputting them and drawing them out, running the command file, operations connected with journaling such as disabling, reading in, creation, etc.);

—drawing out the edited drawing on a plotter, either directly or by creating a file containing commands which can be interpreted by the plotter.

The program has a menu choice system which is easy to learn and manage. Precise drawing is aided by various aids and the possibility of "snapping" them onto drawing elements. In addition to what has been listed the system offers a number of services which greatly facilitate its use and make it convenient (undo, calculator, etc.).

VIDRA 3D

The VIDRA 3D is a general purpose, three-dimensional geometric modelling and display system which is capable of supporting to a large degree such three-dimensional designing activities as are found in mechanical and architectural designing.

The basic principle of the system is to provide simple but very useable basic three-dimensional elements (primitives) and powerful tools with which complex geometric models can be built from the primitives. We can select our "building blocks" from among the following bodies:

cube;
corner;
tetrahedron;
sphere (spherical section);
cylinder (cylindrical section);
straight, curved and narrowing tube;
truncated cone (conic section);
and torus (toroidal section).

With a few special transformations one can create extraordinarily varied three-dimensional shapes out of closed flat curves, always regarding the set of points affected during execution of the transformation as the result of the operation:
elevation—we shift the flat shape along a three-dimensional vector;
projection—we draw projection radii from an optional three-dimensional point to every point on a flat shape;
rotation—we turn the flat shape around an axis falling in the plane of the flat shape.

In addition to the above it is also possible to insert three-dimensional straight lines.

Any constituent element can be built into the model if we give its geometric parameters and three-dimensional location. All these data can be dynamically varied. The customary spatial transformations (shifting, rotation, extension and reflection) are available for this.

The geometric model can be modified (refined) with the following tools depending on the model level (line drawing, surfaces or solid) used:
—the bodies produced can be cut by an optional plane and either of the two parts can be erased;
—lines penetrating the bodies can be generated.

The functions setting or modifying the display are:
—setting the drawing color (from among eight colors);
—seven types of axonometric and parameterable perspective projections are possible;
—use of the already mentioned spatial transformations on the image displayed (that is, on the projection used) aid setting up the image most favorable for study of the model;

—with the aid of the (software) zoom function we can make the smallest details well visible, with appropriate selection of the scaling factor one can get an appropriate size and image section.

A display more faithful to reality is aided if we use:
—the function hiding covered lines, and
—the function doing shading of surfaces according to an optional light direction.

The following are possibilities for describing the model or communicating data based on it:
—GDL (Geometric Description Language) macros aid structured designing or high level data transmission into other systems (capable of interpreting GDL);
—it is possible to save the model to a binary file and reload it to continue the same designing or to put it into another model;
—if we would like to supply the finished drawing with scaling lines, text or designations we can do this with the appropriate functions of the VIDRA 2D, and we can prepare a line level description of our drawing which VIDRA 2D can interpret;
—it is possible to prepare a surface-level IGES metafile for CAD/CAM systems which have an IGES interpreter.

Other services are:
—the figure appearing on the screen can be printed out on a plotter with the following choice possibilities: onto an NE3000 or HPGL command language plotter: from VIDRA 3D (without scaling) or from VIDRA 2D (the final drawing); either directly or through a plotter file;
—a so-called journal file can be generated, which makes possible the "replay" of an entire planning process together with the creation of the model or one can create macro commands from a series of frequently repeated menu element choices;
—a few useful parameters can be set as desired during designing; these include the fineness of the circle (arc) approximation, the density and visibility of the net aiding precision of graphic input, the set of bodies active from the viewpoint of the operations, the views one wants to see on the screen (all or only one), etc.

CAD/CAM Applications

Hopefully a section with the same title may become the most important chapter of a similar article to appear in the near future, which would mean that we will be able to report on CAD/CAM systems built into daily designing-manufacturing processes.

Obviously the success and efficiency of the above described hardware-software system can be proven only if there are more and more such applications—largely relying on the special expertise of cooperating partners.

In addition to the KISHAZ [Little House] architectural designing system and the PIPEMATIC pipe network designing system, already being sold, one can soon expect the appearance of CAD/CAM applications to aid mechanical designing (a drive train designing system) and electronic designing (to design printed and integrated circuits and a logical simulation program).

Autobiographic Notes

Zoltan Hidvegi: I graduated, in mathematics, from the Lorand Eotvos Science University in 1982 and received a diploma there in 1983 in general and applied linguistics. I have worked at the Developmental Institute of the Computer Technology Factory of Videoton since 1982. My work thus far has been connected with programs doing computations and, later, the development of computer graphics systems and CAD applications. I now direct development of the VT 32 graphics software system as group leader. I am married and have two children. I have one true passion in addition to family and profession—soccer.

Viktor Heiczman: I graduated in 1980 as systems engineer from the Moscow Energetics University (MEI) in the electronic computers section of the Automation and Computer Technology School. After university I went to work at the Developmental Institute of the Videoton Electronics Enterprise, where I still work. I deal with development of graphics hardware and firmware as leader of the VT 32 computer graphics group.

8984

Development Plans of Videoton Enterprise of Hungary

25020052b Budapest MAGYAR ELEKTRONIKA in Hungarian No 3, 1988 pp 3-4

[Interview with Laszlo Abraham, technical director of Videoton, by Bela Laczko]

[Excerpt]

MAGYAR ELEKTRONIKA: I am sure that our readers would be very interested in learning the developmental ideas of Videoton. Please summarize them briefly!

Laszlo Abraham: Evaluating and refining our earlier developmental methods, we decided to carry out so-called innovation programs. Essentially what is involved here is that the announcement, direction and management of large scale and especially important programs take place from the technical director level. A study is prepared which sets forth the goal and the necessary expenditures with regard to both the material and human side, examines the economic viability, and finally contains a scenario from which one can see who has what task and when. This system has proven itself well. When a program is formulated one can see all the

critical points and so one can decide whether to start the program or let it slide 1-2 years. (In general we do not reject these major themes, at most we postpone them.)

MAGYAR ELEKTRONIKA: What are your present innovation programs?

Laszlo Abraham: Let me just mention them:

- Starting manufacture of a new TV family in cooperation with Thomson;
- Redesigning the manufacture of printed circuit cards;
- Modernizing the impact printers;
- Starting manufacture of robot controls and robot systems;
- Creating optical memories;
- Creating engineering designing systems;
- Introduction in Hungary of cell radio telephones.

The order is not significant, it hides no priorities.

Within and in addition to these programs we will modernize the manufacturing technology. We will make surface mounting general in all three of our factories and will develop integrated processing centers and flexible manufacturing cells.

This year we will start our manufacture of equipment-oriented integrated circuits. We will make wide use of engineering designing systems. Last but not least, we will lay the foundations for the manufacture of optical elements. This appears a bit premature, but in my opinion now is the time to start.

MAGYAR ELEKTRONIKA: Very serious reorganizations are under way at a number of enterprises. I know that you too are carrying out an organizational modernization. Please describe the essence of the changes!

Laszlo Abraham: Up until now Videoton has tried to better exploit the organizational possibilities and to improve interest relationships. At the beginning of the 1970's it pioneered in developing an organization based on profile centers. But our age requires more vigorous changes. We must exploit the possibilities inherent in the direct interest relationships of smaller, independent managing units and we must find a way to bring in foreign capital to increase our developmental resources. At present the best way to do these things is to establish subsidiary and mixed enterprises which, profile by profile, will constitute integral parts of the future organization of Videoton.

In the middle of 1987 the earlier SZKUBT [Computer Technology Experimental Plant Deposit Association] was converted—after a settling of accounts—into the Videoton Automatics Subsidiary. Its purpose is primarily realization of the mechatronics programs.

As of 1 January 1988, two more subsidiaries were formed to take care of computer technology and consumer goods service and trade tasks. Crudely put, we made the customer service independent, but in reality much more is involved. The two flexible subsidiaries, with small staffs, will better satisfy the needs of users and will be more competitive than the competing small cooperatives. Retail trade authorization will strengthen this process further.

We are dealing seriously with creation of a mixed enterprise to manufacture CD disks, to have a capacity of 6 million units per year.

We plan to establish additional commercial mixed enterprises the primary task of which will be efficient and flexible support for the capitalist export of Videoton.

Naturally the series of reorganizations does not end here, but this already justifies the appointment of a so-called cooperation director to coordinate the subsidiary and mixed enterprises.

Within the parent enterprise we have inserted an enterprise chief engineer level between the technical director and his subordinate main departments. The tasks of the product development chief engineer, the manufacturing development chief engineer and the quality control chief engineer will be operational coordination of the innovation programs and harmonization in their own areas of enterprise level questions.

Going beyond this a restructuring of personnel and spheres of authority as necessary is a natural thing which merits no special mention.

MAGYAR ELEKTRONIKA: In our December issue we posed the question of how a design or technology taken over today—as a license—can be competitive by the end of the century?

Laszlo Abraham: I am happy to talk about this, because at other forums also they are questioning the correctness of our developmental direction. The TV manufacture being introduced at Videoton is based on the mounting of MELF parts (resistors and condensers). It is characteristic of the efficiency of the technology that a mounting automat can mount 300 parts in 20 seconds (!). No other technology today surpasses this efficiency, and the spread of thick film and hybrid circuits will not be strong in the cost sensitive consumer goods field. The Szombathely subsidiary of REMIX will begin mass production of MELF's this year, so every possibility is given for use of the technology even in the year 2000.

As for design, it is essential to know that the microprocessor controlled TV set being manufactured on the basis of the Thomson license is the first member of a new product family. The software for the sets is an intellectual product of Videoton experts, so it is not simply taking over a license. And this fact is the pledge for the

future, because we can create more and more members of the family by modifying the software, with the same hardware (at most new modules may be required). So we have in our hands, already today, a design for super sets suitable for receiving stereo and containing internal satellite units. These features, especially the latter, will be sought after in the year 2000 as well.

And this does not exhaust the possibilities for further expansion. A better quality image can be obtained with double line number deflection, the frequency of the deflections can be doubled, and one can get a "picture within a picture" function as well. I just want to emphasize that a set family is being introduced at Videoton which is open toward the future. The family member suiting market needs will always be the one to be manufactured.

Naturally, these are my personal convictions, time will refute or justify them. There's only 12 years to go and we will know whether this idea was right.

8984

Hungary: Designing Electronic Components With PC

25020039e Budapest MAGYAR ELEKTRONIKA in Hungarian No 1, 1988 pp 17-24

[Article compiled by Imre Abos: "Designing Electronic Components and Preparing Manufacturing Documentation With a Professional Personal Computer—the PC/BOARD System"]

[Excerpts] One can obtain on the world market hundreds of program packages aiding the design of electronic components assembled on printed boards (i.e., aiding the preparation of design and manufacturing documentation). A proper, professional evaluation of them is not a simple task. In this compilation we give a brief description of the 3.0 standard version of the PC/BOARD system developed at MTA SZTAKI [Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences] and used at many enterprises, noting the comparative advantages of the system and possible applications. A broader review (and the solution of non-standard tasks based on the system) can be found in the cited articles and references.

The PC/BOARD produces design and manufacturing documentation for one or more assembled printed boards. The chief elements of this documentation are the following:

—wiring diagram and parts list, the circuit description

—layout and wiring plans, the design documentation

—master films and NC tapes, the manufacturing documentation.

In the course of the designing the PC/BOARD system aids the designer—at the designing workstation—with a sequence of automated and interactive design phases.

The basis of the designing workstation is a professional personal computer (16 or 32 bit). An outline of the work station can be seen in Figure 1.

The equipment needed for a designing workstation is the following:

—an IBM PC/XT/AT (compatible) or PS/2 computer with a PC-DOS or OS-2 operating system, mouse, 640 K bytes of memory (several M bytes for the PS/2), a floppy disk unit, a minimum 10 M byte hard disk unit, CGI or EGA graphics monitor and a matrix printer;

—auxiliary equipment which may include a digitizer (minimum A2 surface), e.g. the FOKGYEM RA-06; a plotter (to prepare test drawings), e.g. the FOKGYEM Graphiplot; an HP 7475A, Houston DMP-41/42 or DMP-51/52.

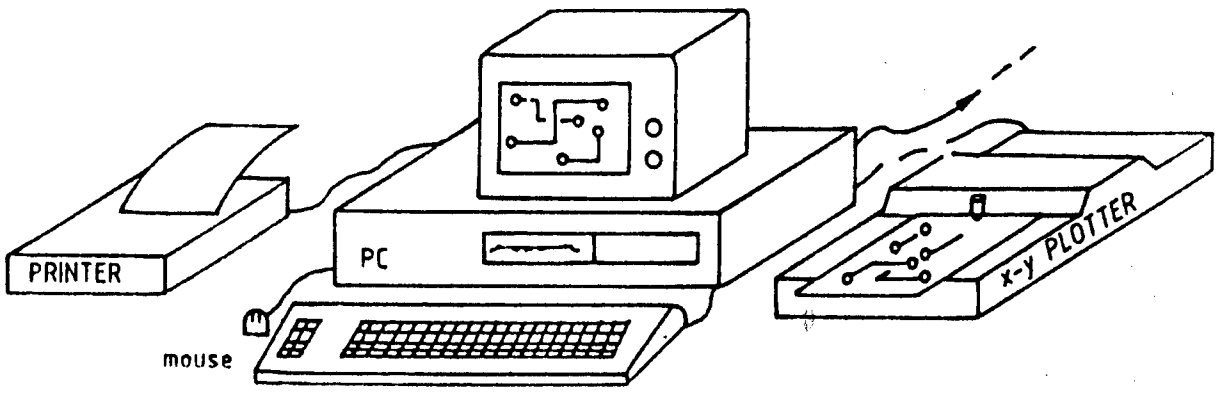


Figure 1. A Designing Workstation

The manufacturing documentation goes onto floppy disk at the designing workstation. The master films can be produced on a photoplotter (FERRANTI, ITEX, etc.) and NC tapes can be produced on a tape punch which can be connected to the computer.

Chief Characteristics of the User System

With a designing system and design methodics a PC/BOARD with the above configuration becomes an independent designing workstation. This system is compatible with the earlier developed AUTER and KTR-1 designing systems, but it is more efficient than they and its basic functions have been expanded to the present form during several years in the course of solving several thousand tasks.

The parameters of the printed boards which can be designed with the system are the following:

—one, two, or more layers (a maximum of 16);
—normal, fine or very fine line drawings (the design rules can be prescribed for automatic designing);
—several lug and hole diameters and wire widths;
—variable design raster dimensions;
—parts suitable for traditional and surface mounting.

All manufacturing documentation for the board can be prepared at the independent designing workstations in a single integrated process starting from the wiring diagram or raster outline. The chief characteristics of this process are the following:

—color, graphic interactive mode, with menu system and mouse;
—parts, frame and technological database as an integral part of the system (loaded with a large volume of data, a possibility for expansion);
—immediate check of unauthorized connections when accepting the wiring diagram;
—automatic check of adherence to the design rules;
—automatic designing of layout and wiring (in this case a maximum of 100 IC's and 6 dm^2 surface with 2-4 layers permitted in the case of 640 K bytes memory; several hundred IC's, 30 dm^2 and 16 layers are the upper limits for computers with greater memory);
—accomodation to the standard descriptions used in many enterprise CADMAT systems (raster description, drawing description, wiring description, circuit description) the detailed specifications for which we also published in documentation for the KTR-1 system;
—the standard, documented and accessible boundary surfaces make possible matching of the system to automatic drawing, manufacturing and testing devices and other programs (e.g. simulation) aiding designing;
—all manufacturing documentation can be stored on floppy disk, from which a number of enterprises can prepare master films, NC tapes or tested printed boards, on order;
—all data for each task stored on one (possibly two) floppy disk so we can create an easily handled documentation archive; we can record the design history, documenting the sequence of modifications;
—the documentation belonging to all printed boards for one device can be archived in a uniform manner;
—a detailed table of contents of the documentation archive on the hard disk unit of the designing workstation can be kept with cross-references so it becomes very simple to manage documentation at the device level.

We show an outline of the designing process in Figure 2. It is essential that the interactive and automatic phases constitute a uniform system. Namely, automatic and interactive layout and wiring phases can follow one another alternately starting from the circuit description; for example, after interactive wiring modification we can again return to automatic wiring.

Evaluation

Among the advantages of the system we might mention that:

—it works on the relatively cheap 16 and 32 bit IBM (compatible) professional personal computers, the price of which is constantly falling;
—it can be supplemented with domestic devices (digitizer, plotter, etc.) which can be obtained for forints;
—it provides all manufacturing documentation, adjusted to domestic technologies and documentation systems;
—it provides an integrated system of interactive and automated phases;
—it creates a basis for enterprise systems, matching to equipment and acceptance of new functions (twin workstation design, circuit simulation, etc.);
—the price of the entire system is also favorable when compared internationally.

8984

Chief Electronics Designer of Hungary's Medicor Interviewed

25020058b Budapest MAGYAR ELEKTRONIKA in Hungarian No 4, 1988 pp 3-6

[Interview with Erno Kiss, chief electronics designer of Medicor, by Peter Horvath]

[Text] MAGYAR ELEKTRONIKA: Preparing and documenting the printed circuit sheet is one of the most important steps in designing electronics. Manual designing takes a lot of time and hides the possibility of many errors. A system to automate this work has been built in the development institute of Medicor, with several workstations connected to it. What does Erno Kiss, leader of the project, have to say about this?

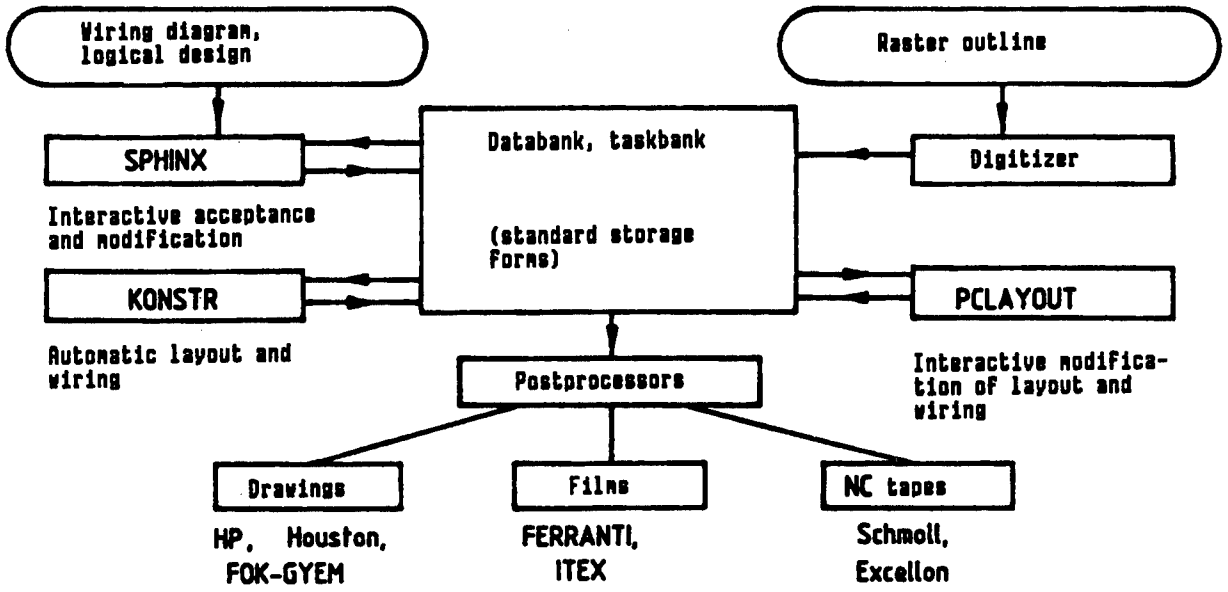


Figure 2. Designing Process Outline

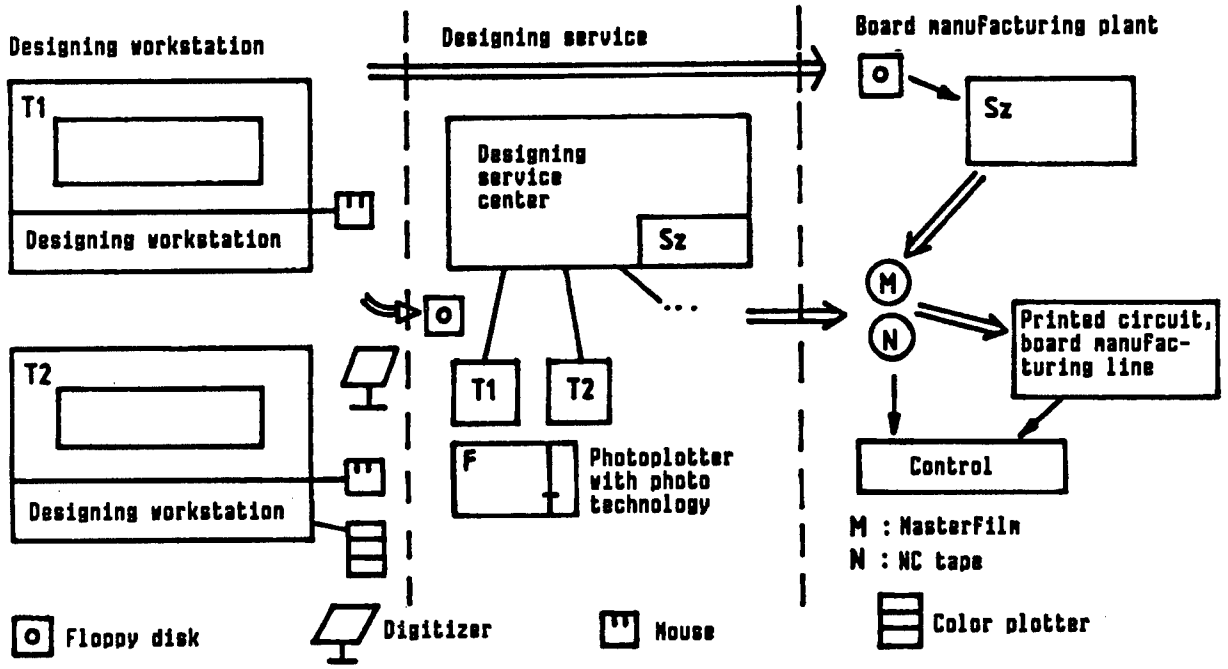


Figure 3. Information Flow Outline

Erno Kiss: It was necessary for a qualitative leap to take place in the area of printed circuit design and we are trying to make maximum use of the advantages of computer aided designing systems. This has a technical aspect, an economic aspect and a necessary aspect in regard to maintaining and expanding market freedom of movement. Let us list these!

Let us look first at the technical part! Today, when the complexity of printed circuits is constantly increasing, the manual designing method is far from offering the security with which reliable printed circuits can be made. At the same time it is commonplace that 80-90 percent of the faulty operation in a device or assembled unit can be traced back to printed circuit errors. The reason for

this is to be sought in the handmade wiring diagram, and with manual methods it is hardly imaginable that we could have one or two leads from the pins of integrated circuits so that the distance tolerances would be adequate, the danger of a short minimal. Another technical justification is reliability of design, which certainly cannot be neglected. Another requirement is fast execution of corrections or modifications which may become necessary.

Another very essential technical justification for computer aided designing is that designing should embrace an entire vertical approach. The first step of designing work is the circuit diagram, which the engineers must prepare. Computer aided designing makes it possible to put the circuit diagram on the screen, and the topology of it goes into the computer with it. The next step is to prepare the wiring plan for the printed circuit with various methods based on the existing circuit diagram. I say "with various methods," because in the case of a printed circuit of medium complexity one can imagine the wiring to be completely automatic; if a more complicated circuit is involved, then we can select between two methods.

One is to do the designing work entirely manually, regarding the computer support as a convenient paper and pencil method. The other is where the designing is partly automatic, where the designer places critical elements or realizes critical connections, and then the wiring is automatic until finally the designer supplements it with those wires which the computer cannot connect automatically. A limited circuit simulation possibility is also part of the complete vertical approach, i.e. the designer has a way of simulating parts of the circuit diagram or the entire circuit diagram in the ad absurdum case, and to be convinced of its correct operation.

I will talk about the limits of our system, but first let me say that the system we use is capable of circuit simulation up to logic circuits of MSI complexity, so we cannot simulate LSI circuits. It is also true that in many cases the problem is not in the immediate vicinity of the processor, but rather with those serving logic circuits which the designer neglected, where he did not think of something.

Regarding the other services of the designing system let me say only that it gives the circuit diagram in any scale, which can be a component of the service manual. It can provide the entire printing diagram, in principle up to 32 layers, of course we use mostly two-layer printed circuit sheets. It gives the direct material cost as a function of certain parameters, in the case of, let us say, a series of less than ten, or between ten and 100, or over one hundred.

Let us look at the economic side of the thing! It is our experience that the worst bottleneck is the technical aid staff capable of doing printed circuit design by hand, preparing the master drawing and the documentation. This system tries to resolve this bottleneck. We have found that preparing the documentation for a medium complexity Europa card takes roughly 2 months, but with the aid of the designing system used by us this work can be reduced to 2 days. We established a direct link with the photoplotter of the MMT [instrument and measurement technology faculty of the Budapest Technical University and the products developed by it] Users Association, so that with the aid of the photoplotter operating at the association we get really good printed circuit documentation, ready for manufacture, within a few hours—for a small transaction fee—using the printed circuit documentation existing on floppy disk.

Let us also say a few words about conditions for staying on the market! It is very essential to win the trust of the customer. If the customer looks inside the device or looks at the documentation and sees that it was designed by computer, he has substantially greater confidence than if it shows that it was pounded together by hand. And our vendors like to talk about the designing system and have greater self-confidence going out on the market, if cards designed this way are involved. When we installed this system we started from the following.

Not only at Medicor but throughout the industry in 80-90 percent of the cases the printed circuit cards and the circuit functions connected to them which fit on one card, are not more complicated than what could be simply designed with the aid of a designing system running on an IBM AT category personal computer. Certainly there are high complexity circuits, where only a mainframe category could be considered, there are circuit simulation needs, where this configuration is far from covering the needs, but I repeat that in 80-90 percent of the cases this hardware-software environment is sufficient, can be used very well, and it is cheap too.

A designing system like this is like an oscilloscope. It must be on the desk of every developer, or at least must be quickly available. It is not, as in an IBM AT environment, like the designing system works locked in a room, but rather it must be out there in development, in the factory too, which will get the results of development.

We decided to install twenty designing workstations, and we did. We also recognized that such a system has resources which cannot rationally be used everywhere, like a good quality plotter which prepares the master drawings or printed circuit layout plans. We established central resources out of such peripherals and the way it works is that the developer, when he has designed a printed circuit at his own workstation and has a circuit diagram, he takes the disk or sends it to the center, where the necessary documentation is prepared within a few hours.

MAGYAR ELEKTRONIKA: There is no in-house local network here?

Erno Kiss: At present there is no local network in-house, but we have planned one because then it would be much simpler to access the resources, and anyway this is the way of the future. When this is built up the work becomes entirely comfortable.

MAGYAR ELEKTRONIKA: This is a digital designing system. But analog circuits occur frequently in medical devices—especially on the input side. Do you have plans regarding this?

Erno Kiss: Yes. From the designing viewpoint it is essentially irrelevant whether we are designing an analog or digital circuit, presuming that there are no restrictions in the analog environment, for example due to danger of noise or instability, when there are strict requirements in connection with the topology.

The present designing system is suitable for preparing printed wiring for parts of analog circuits, or even complete circuits. In essence, what is involved is whether the symbol set, with which the designing system works, contains such elements as an analog IC or transistor. It does, and the element library can be expanded, so there is no obstacle to analog circuit design, although for the moment we do not have an analog circuit simulation system. We will expand the system with one.

Let me say a few words about our greatest joy, that this designing system was started up in record time. We bought it less than a year ago and then in 6 months we were able to install it in the designing units and our engineers and users participated in a very intensive 1-2 week study course where they learned to use the system. At the moment we are at the point where our system is completely occupied with new development work and the developers are enthusiastic about its use.

We got them to accept this technology in development. I feel that it succeeded in the factories too. We are now installing configurations in the factories which are suitable for generating there, from the documentation handed over by development, e.g. on floppy disk, all the documentation needed there. They can make the changes which may become necessary during manufacture, which obviously can be introduced with the agreement of development. So the factory is ready to accept it, and let me mention one more great advantage—this is the best enterprise standardization, the symbol set is uniform at the enterprise level, the technology is uniform, and we can get the people, the enterprise, to accept a standard almost without noticing it, which otherwise could not be carried through without long years of work and whip cracking.

MAGYAR ELEKTRONIKA: If there is one parts base then obviously this also applies to parts standardization.

Erno Kiss: Naturally. I have the philosophy that it is an illusion to issue an enterprise standard and expect it to be adhered to if you do not create the conditions for it. The best standardization is where we appeal to the laziness and feeling for comfort of people. If the standardized parts can be obtained immediately from the warehouse with a chit then the designers will certainly use them, because one will not have to wait 6 months or a year to get the ordered or selected part, one does not have to scurry after them one's self. Naturally the same thing applies to this system too, because the library elements are made up out of standard elements. If someone is working with non-standard elements then he must define a new library element, and this means extra work. And people are basically lazy, which is a real guarantee that the enterprise standard will be implemented much more vigorously than before, without having to use administrative measures.

MAGYAR ELEKTRONIKA: Was there a calculation or evaluation regarding what saving in man hours or forints accompanied installation of the system?

Erno Kiss: This is a very interesting thing because when you must get a new thing accepted then I believe that the correct method is not to calculate what the saving will be in time, hours or money and then demand that people bear the extra burdens if they do not use this system. I do not consider it useful, in the stage of introduction, to reduce the costs allotment which can be turned to the given theme relative to what has gone before, taking into consideration what savings can be realized by use of the system. Adopting a new professional culture is a different world, and the incentive must come from this viewpoint. The situation is that if a person designs his first circuit with this system, then it is slower than it is by hand. It takes roughly 2-3 months to design the first more complicated card. When designing the second, the third, the fourth card they get to the level where the advantages can really be used.

Despite all this there was a calculation. In the case of a circuit which is somewhat more complicated than the average the throughput time can be put at 2 days to go from the circuit diagram to preparation of complete documentation, and this is a very big thing. The given process will always decide what weight this work has in the process of product development. If we are talking about a device like the Medicor Minigram, which is essentially a purely electronic device, where the designing work is directed largely at designing circuit details or circuits on printed circuit cards, then I can say that the saving is very considerable. It can reach 60, 70, 80 percent in time and money compared to traditional methods. If we are talking about a device where the biological signal processing or signal detection is problematic—because generally that is where the problem will be—then obviously the development of the sensor side or near-patient part will require substantially more time than design of the circuit itself. Here the time saving may be less, but it will not be insignificant, if we consider that the manpower shortage is greatest for those having to do such manual work, and we are forced to permit ourselves the luxury of having engineers prepare the printed circuit documentation, which they should not have to do. Anyway they are happy to do it with a computer, because that interests them.

MAGYAR ELEKTRONIKA: If your are designing a given number of cards and the designing time is reduced from two weeks to two days, can you compute the engineer-hour savings for the year?

Erno Kiss: Each year we design 300-400 cards. It follows that if we allow one month per card then this is 300-400

months. If we do all this with the aid of this system then it is 600-800 days. So it is reduced to a tenth or a twentieth.

MAGYAR ELEKTRONIKA: One last question. In addition to money and winning people over, what is most important in designing and installing such a system?

Erno Kiss: I believe it is thinking things through and preparing people to accept it. Such a system can be installed and used only if we ensure all the conditions necessary for its use, from system use to consultation and system maintenance. This last is a terribly important thing. The element libraries are not infinite. New library elements have to be defined and this cannot be left open, it has to be watched. Finally, one more essential thing—a technology is never finished, it is always being developed further, and we have to be very careful that we can make newer versions of the designing system used by us, can exploit its advantages, extending the given technology not only vertically but horizontally as well, making possible a link with other technologies. I am thinking here of preparing manufacturing documentation, for example that with the aid of our designing system it should be possible to have a hierarchy of designed circuit diagrams, which can be copied into a manual. In plain language, the manufacturing documentation system preparing the manual should access the database of the designing system.

Peter Horvath: Thank you for the interview.

8984

Hungary: Use of Simulation To Design Instruments for Nuclear Reactors

25020058c Budapest MAGYAR ELEKTRONIKA in Hungarian No 4, 1988 pp 17-21

[Article by Attila Baranyai, Laszlo Homanyi, Gyorgy Maday and Janos Zsido: "Use of Simulation in Design of an Instrument To Measure the Reactivity of Nuclear Reactors"]

[Excerpts] It is very important to know the reactivity precisely when designing and operating nuclear reactors and in the measurement technology for them. Digital reactivity meters are most appropriate for this purpose. The article describes the designing of a digital reactivity meter using a microprocessor which was developed at the KFKI [Central Physics Research Institute] and it describes the structure of the instrument.

On the basis of the experiences gained with a simulation our developmental goals were:

—A sampling speed of 200 ms. Our model experiments showed that with this sampling frequency one can measure with sufficient precision even the fastest changing reactivity occuring in reactor technology practice.

—Twelve bit A/D conversion. The effect of the resolution of the A/D converter is considerable primarily when measuring the reactivity coefficients accompanying very slow reactivity change.

—Exponential averaging.

—A maximum 20 ms time constant for setting the linear amplifier. In the case of a slower setting one must count on unwanted reactivity transients when changing the measurement limit of the current meter.

The instrument developed uses an ND227-KNK-53M or ND227-CC-54 compensated ionization chamber, it has a precision of 2 percent (relative to final deviation) and the display has a 3.5 digit mantissa and a 2 digit exponent.

The NFA-09.02 digital reactivity meter will surely become a favored instrument for thermal reactors as its primary technical parameters make it suitable for both operational and research measurements. If we compare it to similar Western instruments the price of the new instrument is more favorable and its technical services are equivalent, although its esthetic appearance lags behind them. We have no information about a similar device on the socialist market.

Autobiographic Notes

Attila Baranyi: I was born in Budapest in 1943. After finishing the Jeno Landler Communications Industry Technikum I worked for 2 years in the Communications Engineering Industry Research Institute (HIKI). I graduated from the Electrical Engineering School of the Budapest Technical University (BME) in 1968. My first job as an engineer was with the HIKI. Since 1973 I have been working at the KFKI, currently as chief of a scientific department. I defended my academic doctoral dissertation in 1979. I have two children and like to spend my free time gardening.

Gyorgy Maday: I was born in Budapest in 1958. I graduated from the Lajos Petrik Chemical Industry Professional High School. I got a factory engineering degree at the Kalman Kando Electric Industry College in 1980 and an electrical engineering degree at the BME in 1987. I have been working at the KFKI since 1980. At the KFKI I participated in hardware development for the nuclear industry instrument family and in the VEGA program.

Laszlo Homanyi: I was born in Budapest in 1948. I got a technician's diploma at the Jeno Landler Communications Industry Technikum in 1967. I worked at the Electromechanical Enterprise and at the Electronic Measuring Instruments Factory. Here I participated in hardware development work for nuclear instruments, primarily the nuclear industry instrument family.

Janos Zsido: I defended my diploma work in the electroacoustic and ultrasonic technology section of the Odessa Technical University in 1977. After returning

home I spent 2 months with the MAV [Hungarian State Railways] and since November 1977 have worked at the KFKI. As a scientific colleague I participated in hardware and software development of the nuclear industry instrument family and in several themes of the VEGA and PHOBOS programs.

8984

Table of Contents of Hungarian Electronics Journal

25020052a Budapest MAGYAR ELEKTRONIKA in Hungarian No 3, 1988 p 2

[Text]

On Our Cover

A graphic by Ivan Mihalyfi on our cover portrays the activities of the Flexis Joint Stock Company. This company, with Hungarian, Austrian and American participation, went on the market last year in what is perhaps the most dynamically developing area of electronics applications, manufacturing automation. The firm deals primarily with machine industry manufacturing automation—computerized designing, manufacturing cell testing and the organization of flexible manufacturing systems.

Shop

In our Shop section we describe the activities of Flexis more closely—naturally with the aid of professional articles. Miklos Hajnal has summarized the general questions of the automation of manufacturing systems. Kerekes and Raboczky describe an example of designing. Horanyi, Bertok and Csurgai describe the FLEXCELL manufacturing cell control. Mrs. Volgyi describes a manufacturing resource designing program package. Asboth and Kovacs describe the SATT program package, a tool for designing complex systems.

Professional Policy

In a curious way an article dealing with a development has gotten into our Professional Policy section. Ferenc Szlavik, a member of our editorial committee, was right in recommending this section for an article dealing with Hungarian Winchester development—describing the career of a development as an example can be a professional policy question. For our part we consider it very significant that the first socialist hard disk drive (a Winchester driver) has been born. And we must trust that manufacture will begin soon (not after years have passed!).

8984

Table of Contents of Hungarian Electronics Journal

25020058a Budapest MAGYAR ELEKTRONIKA in Hungarian No 4, 1988 p 2

[Text]

On Our Cover

On our cover one can see automatic equipment developed by the EMG [Electronic Measuring Instruments Factory] to test linear integrated circuits. The equipment fits into the factory's measurement automation program and is part of the grading equipment for manufacture of electronic equipment. These instruments constitute a significant part of the family of "intelligent" measurement instruments. The introductory article by Zoltan Vermes describes the classification of the instruments and the concept of "intelligence." The question of intelligence—as we shall see—is still debated in this area; the concept used in our issue refers to the processing of measured data.

Measurement Technology

Under the general heading "Measurement Technology" we deal with modern, intelligent measuring instruments. The review by Zoltan Vermes deals with a classification of today's electronic desk-top measurement devices and shows why it became necessary to build artificial intelligence into these systems. The colleagues from the KFKI [Central Physics Research Institute] describe the theoretical foundations for the design of a reactivity meter which plays an important role in measurement technology for nuclear reactors and they describe the building of the microprocessor instrument developed by them. The collective of authors from the instrument and measurement technology faculty of the Budapest Technical University describe a PC based final allignment and final check workstation which can be used in many ways.

Data Processing

The author in our Data Processing section deals with library databases. It is striking that while access, transmission and processing in general become ever faster with the development of electronics, the computerization of libraries proceeds quite slowly. Optical data storage may accelerate this process, the computerized processing of the gigantic mass of library data. With such storage an extraordinary amount of information fits into a very small space—about 200,000 typed pages on one CD-ROM disk. The article describes the DAO [Dissertation Abstract Ondisk] service of the MTA Library realized with this technique.

8984

Foreign Broadcast Information Service (FBIS) and Joint Publications Research Service (JPRS) publications contain political, economic, military, and sociological news, commentary, and other information, as well as scientific and technical data and reports. All information has been obtained from foreign radio and television broadcasts, news agency transmissions, newspapers, books, and periodicals. Items generally are processed from the first or best available source; it should not be inferred that they have been disseminated only in the medium, in the language, or to the area indicated. Items from foreign language sources are translated. Those from English-language sources are transcribed, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [ ] are supplied by FBIS/JPRS. Processing indicators such as [Text] or [Excerpts] in the first line of each item indicate how the information was processed from the original. Unfamiliar names which are rendered phonetically or transliterated by FBIS/JPRS are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear from the original source but have been supplied as appropriate to the context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by the source.

SUBSCRIPTION/PROCUREMENT INFORMATION

The FBIS DAILY REPORT contains current news and information and is published Monday through Friday in 8 volumes: China, East Europe, Soviet Union, East Asia, Near East & South Asia, Africa (Sub-Sahara), Latin America, and West Europe. Supplements to the DAILY REPORTs may also be available periodically and will be distributed to regular DAILY REPORT subscribers. JPRS publications generally contain less time-sensitive information and are published periodically. Current JPRS publications are listed in *Government Reports Announcements* issued semi-monthly by the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, Virginia 22161 and the *Monthly Catalog of U.S. Government Publications* issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

U.S. Government offices may obtain subscriptions to the DAILY REPORTs or JPRS publications (hardcovers or microfiche) at no charge through their sponsoring organizations. DOD consumers are required to submit requests through appropriate command validation channels to DIA, RTS-2C, Washington, D.C. 20301. (Telephone: (202) 373-3771, Autovon: 243-3771.) For additional information or assistance, call FBIS, (703) 527-2368, or write to P.O. Box 2604, Washington, D.C. 20013.

The public may subscribe to either hardcover or microfiche versions of the DAILY REPORTs and JPRS publications through NTIS at the above address or by calling (703) 487-4630. Subscription rates will be provided by NTIS upon request. Subscriptions are available outside the United States from NTIS or appointed foreign dealers. Back issues or single copies of the DAILY REPORTs and JPRS publications are not available. New subscribers should expect a 30-day delay in receipt of the first issue.

Both the DAILY REPORTs and the JPRS publications are on file for public reference at the Library of Congress and at many Federal Depository Libraries. Reference copies may also be seen at many public and university libraries throughout the United States.